

Operating Instructions

DA-X

Part Number AC 754 081

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Identification of the machine

Your dealer requires some information about your machine in order to be able to help you as quickly as possible. Please enter the information here.

Designation

DA-X

Working width

Weight

You can find this data on the type plate

Machine number

Accessories

Dealer's address

Manufacturer's address

Kverneland Soest GmbH
Coesterweg 42
D-59 494 Soest
Tel. +49 (0)2921 / 974-0

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Target group of this operating manual

This operating manual is directed at trained farmers and individuals who are otherwise qualified to perform agricultural activities and who have received training in the operation of this machinery.

For your safety

Before attempting to use or install this machinery, familiarise yourself with the contents of this operating manual. In this way, performance and work safety are optimised.

As employer

All personnel are to be trained in the use of the machine regularly (at least once a year) in accordance with employers' liability insurance association guidelines. Untrained or unauthorised individuals are not permitted to employ the machinery.

Training

Your dealer will instruct you in the operation and care of the machinery.

Meaning of symbols

In order to make this manual clear and easy to read, various symbols are used. They are explained below:

- A dot accompanies each item in a list
- A triangle indicates operating functions, which must be performed
- An arrow indicates a cross-reference to other sections of this manual

In addition, pictograms are used to help you to find instructions more quickly:

NOTE The term, "Note", indicates tips and information concerning operation.



The screwdriver indicates tips during assembly or adjustments.



The warning triangle indicates important safety instructions. Failure to observe these safety instructions can result in:

- Serious operational faults for the machinery;
- Damage to the machinery;
- Personal injury or accidents.



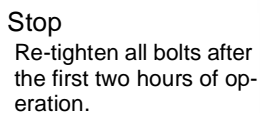
A star indicates examples that assist understanding of the instructions.

In this chapter you will find general safety instructions. Each chapter of the operating manual contains additional specific safety instructions, which are not described here. Observe the safety instructions

- Numerous risks can result from handling agricultural machines in the wrong way. Therefore, always work with special care and never under pressure.

Inform personnel working with the machine of these safety instructions at regular intervals and according to statutory regulations.

For safety purposes, stickers are provided on the machine. The stickers must not be removed. If stickers become illegible or begin to peel off, new stickers can be ordered and attached in the appropriate places.





Meaning of the warning symbols



Read the operating manual and follow the instructions

Initial operation of the machine must not take place before the operating manual has been read and understood. This applies especially to safety instructions.



Do not stand between the tractor and the machine

Standing between the tractor and the machine is especially prohibited during coupling and uncoupling and when the motor is running. The tractor must be additionally immobilised.



Riding on the machine is strictly prohibited

Serious or fatal injury can be the result.



Caution - escaping hydraulic fluid

Observe the corresponding safety instructions in the operating manual.



Never remove the guards.

Never open or remove the guards while the engine is running. Never operate the equipment without the guards in place.



Do not stand in the swivelling range

There is serious risk of injury in the swivelling range due to swivelling or folding machinery components.



Crushing hazard

Avoid area of danger. Gaps between components may become smaller or disappear completely.



Who is authorised to operate the machine?

Only qualified personnel

Only qualified persons who have been informed of the dangers associated with handling the machine are permitted to operate, service or repair the machine. As a rule, such persons are trained and experienced in agricultural work or have been thoroughly trained in a similar fashion.

Coupling

Increased risk of injury

Coupling the machine to the tractor represents an increased risk of injury. Therefore:

- secure the tractor in such a way that it cannot roll forwards or backwards
- the tractor and machine must belong to the same category
- never stand between the tractor and the machine during coupling
- Slowly and carefully engage the three point power lift.

Do not connect electric wires or cables until after mounting the attachment

The electrical supply must not be connected to the tractor when mounting the lighting equipment.

Hydraulic connection depressurised

Only connect hydraulic hoses to the tractor hydraulic system if the tractor and machine hydraulic system is depressurised.

High pressure in the hydraulic system

The hydraulic system is under high pressure. Regularly check all pipes, hoses and bolted connections for leaks and externally visible damage. Only use suitable agents when looking for leaks. Eliminate damage immediately. Escaping fluid may result in injuries and fires. In the event of injuries, seek medical attention immediately.

Colour designation of hydraulic connections

To prevent operating errors, plug sockets and plugs for hydraulic connections between the tractor and the machine must be colour-designated.

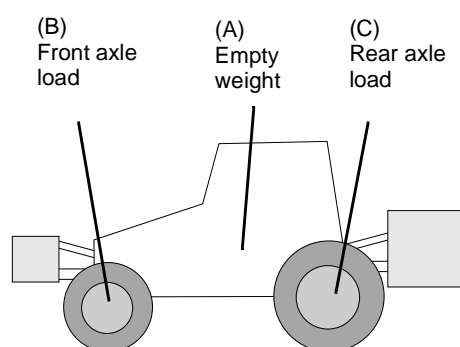


Observe the total weight, axle loads, tyre load-bearing capacity, and minimum ballast specifications.

The machine's front or rear attachment must not exceed the tractor's permissible total weight, its permissible axle load or its tyre load-bearing capacity. In order for steering capability to be maintained, the front axle must bear at least 20 % of the tractor's empty weight.

The following can be easily calculated:

- Total weight
- axle load
- tyre load-bearing capacity and
- minimum ballast

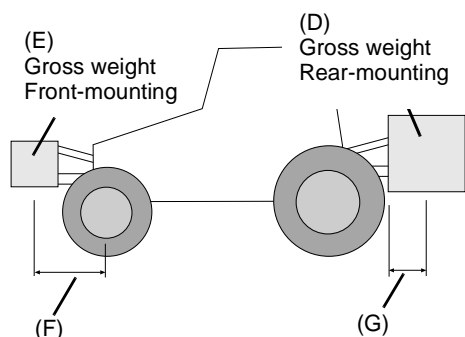


For this calculation, the following data is required:

Data from the tractor's operating manual:

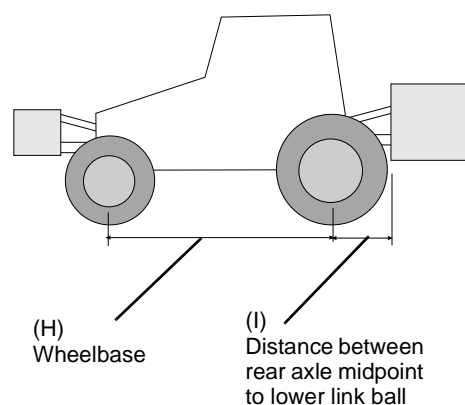
- (A) empty weight
- (B) front axle load
- (C) rear axle load

Make allowances for the weight of water in the tyres, accessories, etc.



Data from this operating manual:

- (D) Gross weight of the equipment when rear-mounted; the supporting load with the equipment attached;
- (E) machine's total weight in the front attachment
- (F) distance between the machine's centre of gravity in the front attachment and front axle midpoint.
- (G) Distance between the centre of the lower link ball and the machine's centre of gravity in the rear attachment. With equipment attached, $G=0$.



Data which you can determine by performing measurements:

- (H) the tractor's wheel base
- (I) distance between the rear axle midpoint and the lower link ball midpoint



Calculation

The measured values can now be inserted into the formulae.

Front ballast

Calculation of the **front ballast**
for machines on the rear attachment.

$$\text{Front ballast in kg} = \frac{D \times (I + G) - (B \times H) + (0,2 \times A \times H)}{F + H}$$

Rear ballast

Calculation of **rear ballast**
for machines on the front attachment.

$$\text{Rear ballast in kg} = \frac{(E \times F) - (C \times H) + (0,45 \times A \times H)}{H + I + G}$$

Front axle load

Calculation of the **actual front axle load**

$$\text{Front axle load in kg} = \frac{E \times (F + H) + (B \times H) - D \times (I + G)}{H}$$

Total weight

Calculation of **actual total weight**

$$\text{Total weight} = E + A + D$$

Rear axle load

Calculation of the **actual rear axle load**

$$\text{Rear axle load in kg} = \text{actual total weight} - \text{actual front axle load}$$

Tyre load-bearing capacity

Data on the tyre load-bearing capacity of the front and rear wheels can be found in the tyre manufacturer's details.

The front tyre load-bearing capacity for two wheels is equal to twice the permissible tyre load-bearing capacity of a single front wheel. The rear tyre load-bearing capacity for two wheels is equal to twice the permissible tyre load-bearing capacity of a single rear wheel.

Application

The actual values for the rear axle load must be less than the permissible values given in the tractor's operating manual. Tyre load-bearing capacity must be greater than the values for the rear axle load given in the operating manual.

The actual total weight must be less than the permissible total weight given in the tractor's operating manual. If not, the machine must not be coupled to the tractor.

NOTE If you have a sufficiently large weigh-bridge, you can determine the total weight and the rear axle load by weighing.



Road transport

Ensure that the machine conforms to traffic regulations

The machine must conform to current traffic regulations if you intend to drive it on public roads. This means that, e.g.:

- lights, warning equipment and protective equipment are installed
- the permissible transport width and weight, axle load, tyre load-bearing capacity and total weight are observed.

Check the trip ropes for the quick release coupling

Trip ropes must hang loose and must not, when in their lowered position, release the couplings of their own accord.

No riding on the machine

Riding on the machine is hazardous and strictly prohibited.

Altered driving and braking performance

Driving and braking performance are altered when the machine is attached to the tractor. Take the width and balancing weight of the machine into consideration, especially on sharp bends.

Adjusted speed

Rough surface conditions and excessive speeds can generate extreme forces that can stress or overload the tractor and the machine material. Therefore, adjust your speed to the road conditions.

Putting the machine into operation

Initial operation only after training.

The machine must not be put into operation until the user has been given proper initial instruction, either by the dealer or by one of the manufacturer's representatives or employees.

Ensure that the machine is in perfect working condition

Do not operate the machine unless it is perfect working condition. Check all important components and replace any defective components before starting the machine.

Do not remove the protective equipment

Protective equipment must not be removed or by-passed. Check all protective equipment before starting the machine.

Check tyre pressure

Check tyre pressure regularly.

No riding on the machine

Riding on the machine is hazardous and strictly prohibited.

**Check immediate vicinity**

Before starting, extending, and during operation, check and be aware of your surroundings. Make sure the operator has a sufficient view of the work area. Do not begin work until the immediate vicinity is cleared of any persons or objects.

Re-tighten all nuts and bolts

Nuts and bolts should be checked at regular intervals and tightened if necessary.

Action in the case of malfunctions

In case of operational problems, immediately stop, shut down, and secure the machinery. The malfunction may be eliminated immediately, or a workshop must be commissioned.

Uncoupling

Increased risk of injury

There is an increased risk of injury when uncoupling the machine from the tractor. Therefore:

- secure the tractor in such a way that it cannot roll forwards or backwards
- never stand between the tractor and the machine during uncoupling.
- actuate the three-point power lift system slowly and carefully.
- make sure the machine is standing on a secure and level surface.
- Only disconnect hydraulic hoses if there is no pressure in the tractor and machine hydraulic system.



Care and maintenance

Adhere to the care and maintenance intervals

Observe prescribed intervals for maintenance checks and inspections specified in the operating manual.

Use only OEM replacement parts

Many components have special characteristics which are essential for the machine's stability and correct function. Only those replacement parts and accessories supplied by the manufacturer have been tested and approved. Using other products may lead to malfunctions or reduce the safety of operation. The use of non-OEM replacement parts renders the manufacturer's guarantee null and void and releases the manufacturer from all liability.

For all care and maintenance work:

- switch off the tractor's power take-off shaft
- depressurise hydraulic system
- Whenever possible, uncouple the tractor;
- Make sure the unit is standing securely. Provide additional support as required;
- do not use parts of the machine to climb onto it; use only secure steps, ladders or other means of access
- Chock the machinery wheels to prevent it from rolling;
- Never reach into the V-belt while it is moving.

Switch off power supply

Prior to carrying out work on the electrical system, disconnect it from the power supply.

Replace hydraulic hoses

Hydraulic hoses can age without this being externally visible. Therefore, we recommend that the hydraulic hoses be replaced every three years.

Caution when cleaning using a high-pressure cleaner

The machine can be cleaned using either water or a steam jet. Only use a low pressure to clean bearings, fans, signal mixer units, plastic parts and hydraulic hoses.

Prior to welding work

Prior to carrying out electrical welding work on the attached machine, disconnect the tractor's battery and generator.

Tighten all bolted connections

All screw connections that are released during maintenance and repair operations must now be re-tightened.



Further regulations

Observe the regulations

In addition to those listed above, please observe the following safety instructions:

- accident-prevention regulations
- generally recognised safety regulations, occupational health requirements and road traffic regulations
- information in this operating manual
- regulations pertaining to operation, maintenance and repair.

This section contains general information on your machine as well as information on:

- Range of application
- Features
- Designation of the assemblies, and;
- Technical specifications

Range of application for the machine

The DA-X is seed drill designed to be saddled on power harrows. It can also be driven as a stand-alone device if a tractor triangle is employed.

Proper use

Any application other than or beyond this, e.g., as a means of transport, for stump pulling, or to transfer power to other objects is considered improper use. The manufacturer and dealer are not liable for damage caused by improper use. Improper use is solely at the risk of the user.

Features of the machine

Perfected type

Specially hardened materials combined with an optimised construction, a flexible modular design, and a favourable centre of gravity all make this efficient and precision machine a reliable and sturdy device.

Distributor outside the tank

You can utilize the entire tank volume, while filling is easily handled.

Precise metering

The original Accord pneumatik system ensures precise metering.

Quick conversion

Conversion from normal to fine seed is quick and requires no tools.

Tramlining system

The DA-X can be combined with FGS, ESC, or ESA.

Coulters

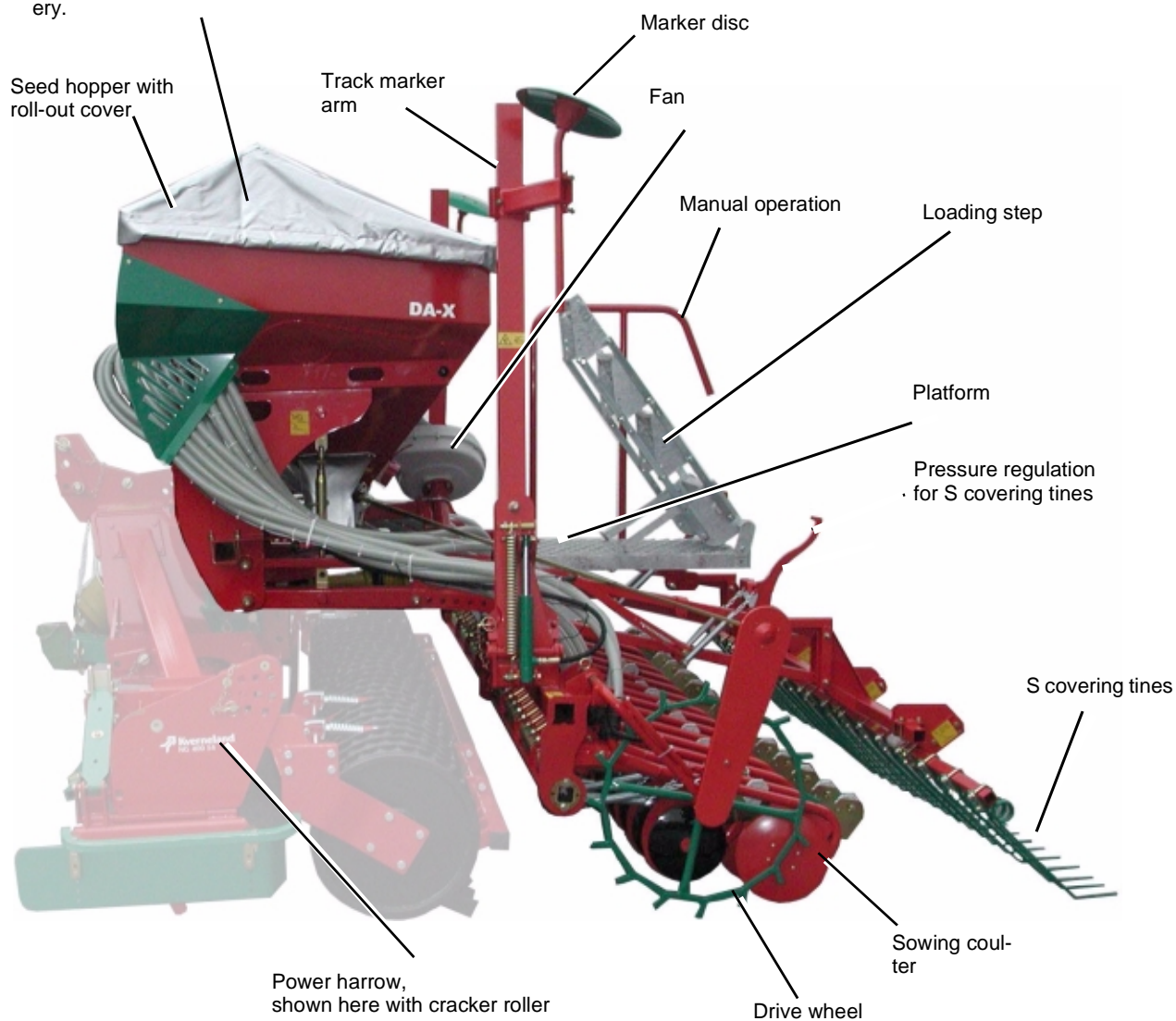
Normal coulters, CX sowing coulters, or CX Plus disc coulters can be selected, based on the prevailing application conditions.

Safety

The machine is constructed in accordance with EU and German national regulations, for maximum possible safety of operation. The machine bears the symbol of European Conformity (CE).

Assembly designation

Dispensing pan, tools, spare parts list, and operating manual are located in the seed hopper at delivery.



Familiarisation

Technical specifications

General

Height (m) w./o. tractor lift height		
Depending on the power harrow		
Width (m)		
Machinery in operating position		3,00 / 4,00 / 4,50
Depth (m)		
Depending on the power harrow and equipment level		
Gross weight (kg)		
Depending on equipment level, approx.		900-1150
Seed hopper		
	Fill height (m)	Depending on the power harrow
	Hopper volume (l)	1000 / 1500
	Maximum hopper capacity, approx. (kg of wheat)	800 / 1200
Noise level (dBa)		
	Fan, at 1,000 rpm	98

Miscellaneous

Tractor		
	Minimum towing capacity (kW)	30 KW / m
	PTO (rpm)	1000
	Design	1 3/8", 6-part
FGS, ESA, ESC		
	Power supply (V)	12
	Fuse (A)	30

Scope of delivery

Soil Preparation and Drilling Technology

The machine is delivered completely assembled. If parts of the machine have not been assembled, please contact your dealer.



Do not assemble the machine yourself

Do not try to assemble the machine yourself, as

- the correct sequence of assembly steps and
- the observation of permissible tolerances and torques

are essential for the proper working condition of the machine.

FGS, ESA, and ESC

The tramlining control system (FGS), the electronic seed-drill drive (ESA), and the electronic seed-drill control (ESC) are also available as optional accessories. Your agricultural equipment dealer will perform the final installation on your tractor.

NOTE If parts are missing or have been damaged during transportation, please submit a complaint immediately to your dealer, importer or the manufacturer.

Coupling the Machinery



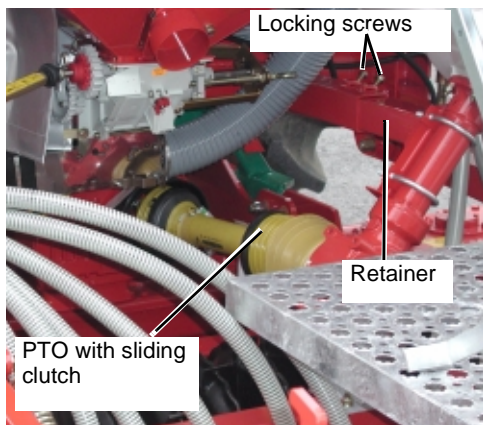
- Never stand between the tractor and the equipment during coupling.

Coupling the power harrow is described in the operating instructions for the pneumatic seed drills. These supplemental instructions deal only with the particular features unique to the DA-X.

PTO installation



- Before working on the PTO, shut the engine off and remove the ignition key!
- Install only the supplied PTO or one of an identical type.
- Make sure the PTO connections lock securely in place during installation.



Depending on the power harrow involved, the PTO will need to be shortened prior to installation. This task may only be performed by properly qualified individuals.

- Loosen the locking screws.
- Pull the retainer with the fan out far enough to permit installation of the PTO.
- Install the PTO with the side on which the sliding clutch is located facing towards the seed drill. The PTO must engage correctly and be secured with the safety chains.
- Push the retainer completely in to its stop, then pull it back out approx. 2-3 cm.
- Secure the retainer with the locking screws. Note the following: Both screws must secure the retainer.

Electrical connections

Now connect the power cable for the tramlining control system (FGS), electronic seed-drill control (ESC), or the electronic seed-drill drive (ESA) and the machine's lighting system to the tractor.

Hydraulic connections

Connect the hydraulics as described in the »Hydraulic System« chapter, under »Connection to the Tractor«.



- In the transport position, secure the control unit on the tractor to prevent accidental activation.
- Employing the machine with different tractors may result in incompatible oil mixtures. Such a mixture of incompatible oils can result in the destruction of tractor components.
- All hydraulic connections must be properly made and must be examined for secure fit after connection.
- The fan speed may not exceed 5,000 rpm for hydraulic fan drives.
- Inspect the hoses.

Familiarise yourself with the hydraulics.

Connection to the Tractor



- Only connect the hydraulics if the engine is turned off and the PTO shaft is disengaged.
- Chock the tractor wheels to prevent it from rolling!

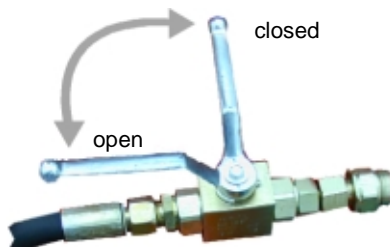
➤ Connect hydraulic hoses to:

one single-acting control valve each

Function (single acting)	Colour coding
<ul style="list-style-type: none"> • Track marker, pre-emergence marker 	Green
<ul style="list-style-type: none"> • Hydraulic fan drive (plus pressure-free return and LS with Power Beyond) 	Blue

One double-acting control valve each

Function (double acting)	Colour coding
<ul style="list-style-type: none"> • Hydraulic share bar adjustment • Hydraulic share pressure adjustment 	– Red



- If the hydraulic hoses to the tractor are equipped with ball valves, open all of these.

Hydraulic System



Prior to operation, carefully inspect the hydraulic hose connections and the hoses themselves. Hot hydraulic fluid can squirt from insufficiently tightened or damaged hydraulic hoses, resulting in severe injury.

Retracting the Track Markers

The pre-emergence markers can be retracted using the hydraulic hose marked in green, e.g., to avoid obstacles.

- NOTE:**
- If an ESA is being used, the metering devices continue to operate until the track markers are fully retracted.
 - If an ESA/ESC or FGS is being used, the tramline sequence must be corrected after the separate retraction of a track marker.

Hydraulic fan drive

The fluid is guided to a 3-way flow control valve and regulated according to the hydraulic motor speed. This constant fluid rate results in a specific rotational speed of the hydraulic fan drive. This speed can be checked on the ESA or ESC on the display.

Technical specifications

Technical specifications for the hydraulic fan drive are listed in the table.

		Values
Hydraulic motor	Displacement (ccm)	8
	Speed (rpm)	4500
Fluid supply	Minimum feed line pressure (bar)	160
	Maximum return line pressure (bar)	10
	Oil flow rate (l / min)	43,5
Fan	Fan speed (rpm)	4500

- Speed ± 50 rpm, once the speed has levelled out at a constant oil temperature .

Line cross-sections

	Feed line	Return line
Line cross-section, minimum da di	DN 10 12 mm 9 mm	DN 12 15 mm 12 mm
Line cross-section, recommended da di	DN 16 18 mm 15 mm	DN 16 18 mm 15 mm

Prerequisites

Prerequisites for the hydraulic fan drive at the tractor:

- Adequate oil supply from the tractor;
- An appropriate number of control valves are installed;
- Control valves can be activated in parallel;
- An oil cooler has been installed.

For John Deere tractors, including Series 50:

- The flow control valve must be converted from 3-way to 2-way. Refer to Section »For tractors without flow control valves, with control pumps« beginning on page 24.

Types

The unit can be equipped with either a

- Type 1 or
- Type 2 (configured for Power Beyond)

flow control valve.

Hydraulic System

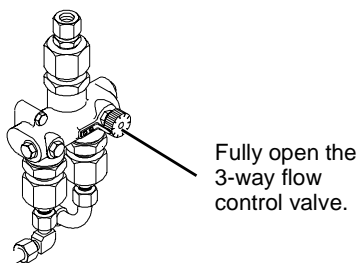
Type 1 Flow Control Valve

Fan Speed Adjustment



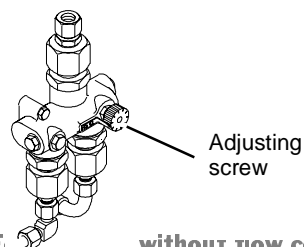
- Prior to operation, carefully inspect the hydraulic hose connections and the hoses themselves. Hot hydraulic fluid can squirt from insufficiently tightened or damaged hydraulic hoses, resulting in severe injury.
- The maximum permissible fan speed is 5,000 rpm. At higher speeds, the fan can explode.
- Wear ear protection when working near the fan.
- Conversion from a 3-way to a 2-way flow control valve, or vice versa, may only be done with the fan turned off.

For tractors with flow control valves



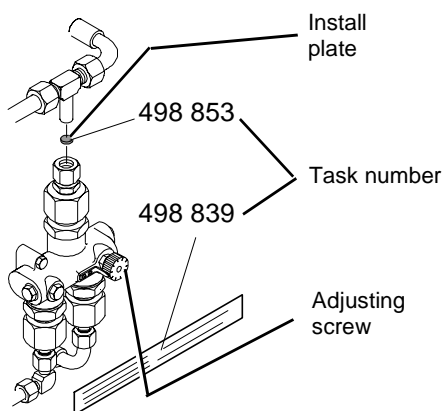
- Fully open the 3-way flow control valve.
- Adjust the desired fan speed by regulating the oil flow rate at the tractor.

For tractors without flow control valves, without control pumps



- Use the adjusting screw on the 3-way flow control valve to adjust the desired speed.

For tractors without flow control valves, with control pumps



- Convert the 3-way flow control valve to a 2-way flow control valve as shown in the diagram.
- Use the adjusting screw on the 2-way flow control valve to adjust the desired speed.

Flow control valve

Type 2

Fan Speed Adjustment



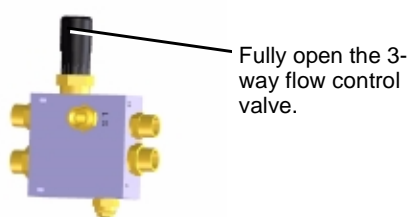
- Prior to operation, carefully inspect the hydraulic hose connections and the hoses themselves. Hot hydraulic fluid can squirt from in-

sufficiently tightened or damaged hydraulic hoses, resulting in severe injury.

- The maximum permissible fan speed is 5,000 rpm. At higher speeds, the fan can explode.
- Wear ear protection when working near the fan.
- Conversions from a 3-way to a 2-way flow control valve – or vice versa – and fan speed adjustment may only be done with the fan turned off.

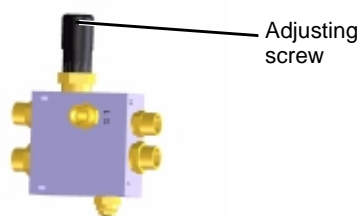
The basic flow control valve adjustments need only be performed prior to initial start-up or if a different tractor is employed.

For tractors with flow control valves



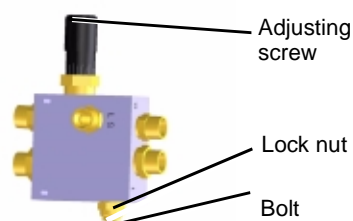
- Fully open the 3-way flow control valve.
- Adjust the desired fan speed by regulating the oil flow rate at the tractor.

For tractors without flow control valves, without control pumps



- Use the adjusting screw on the 3-way flow control valve to adjust the desired speed.

For tractors with flow control valves and control pumps



The flow control valve must be converted from 3-way to 2-way. Perform the conversion as follows:

- Loosen the locknut.
- Turn the screw fully in. Turning the screw fully in converts the 3-way flow control valve to a 2-way valve.
- Retighten the locknut.
- Use the adjusting screw on the 2-way flow control valve to adjust the desired speed.

Hydraulic System

Operation



All hydraulic connections must be properly made and must be examined for secure fit after connection.

Initial Start-up

The following applies to the initial operation with oil:

The fan speed will continue to change independently until the hydraulic fluid has reached its normal operating temperature. The adjustment is not complete until the fan speed has stabilised.

- During adjustment, continuously monitor the fan speed with the revolution counter on the ESA or the ESC.
Refer to Chapter, »ESA«, beginning on page 62, or Chapter, »ESC«, beginning on page 40.

Subsequent Start-ups

The following applies to all subsequent start-ups with cold oil:

- During the warm-up period, the fan speed will be somewhat higher.
- After a short time, the fan speed self-adjusts to the value set during the initial start-up adjustment.

Operation with Two Hydraulic Motors

The tractor oil supply must be adequate to permit the simultaneous operation of two hydraulic motors. If you have previously only operated with one motor, have your dealer install a parallel circuit.

Power Beyond

The hydraulic fan drive is a continuous consumer in the hydraulic system. This means that there is frequently insufficient power available for other consumers. Utilization of Power Beyond allows this loss of power to be minimised when the hydraulic fan drive is employed as a continuous consumer so that other consumers can be activated simultaneously. However, Power Beyond does not increase the hydraulic pump's conveying capacity.



- The installation must be performed by a qualified service centre.
- Conversions from a 3-way to a 2-way flow control valve – or vice versa – and fan speed adjustments may only be done with the fan turned off.
- Connections may only be made with the PTO switched off.
- Carefully inspect the hydraulic hose connections and the hydraulic hoses before start-up. Hot hydraulic fluid can squirt from insufficiently tightened or damaged hydraulic hoses, resulting in severe injury.

Prerequisites

Prerequisites for the Employment of Power Beyond:

- The tractor is equipped with
 - Control pump,
 - Load sensing system,
 - Feed line (P),
 - Return line (T),
 - Control line (LS),
 - Possible leak fluid line (D)
- The machine is equipped with
 - A Type 2 flow control valve (refer to page 24).

Calculating the Remaining Conveying Capacity

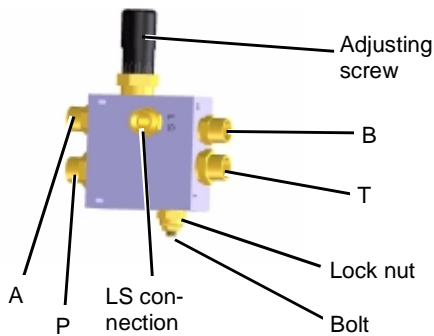
The hydraulic pump's conveying capacity determines the lift speed. The greater the conveying capacity, the higher the lift speed. Power Beyond allows other consumers to be activated while the continuous consumer is operating, but does not increase the hydraulic pump's conveying capacity. The lift speed drops.

EXAMPLE:

Hydraulic pump conveying capacity	100 l/min
Fluid volume required by the continuous consumer	40 l/min
Conveying capacity remaining for other consumers	60 l/min
Reduction of the lift speed to	60 %

Hydraulic System

Conversion to a 2-way flow control valve



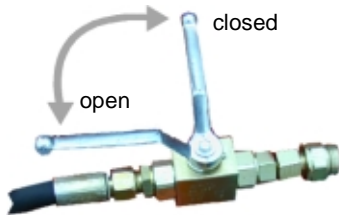
A = Forward flow (feed) to the hydraulic motor
B = Return flow from the hydraulic motor
P = Feed
T = Return
LS = Control line

The flow control valve must be converted from 3-way to 2-way. Perform the conversion as follows:

- > Loosen the locknut.
- > Turn the screw fully in.
Turning the screw fully in converts the 3-way flow control valve to a 2-way valve.
- > Retighten the locknut.

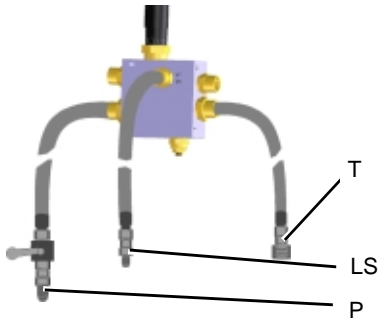
Use the adjusting screw on the 2-way flow control valve to adjust the desired speed.

Connection on the tractor



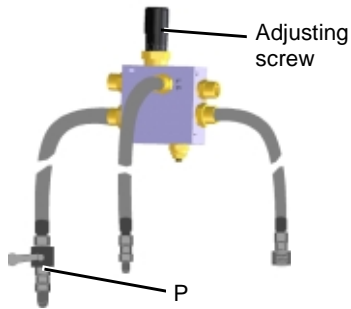
NOTE Depending on the make of the tractor, the couplings and connectors may differ. When changing tractors, please consult your dealer.

- > Close the ball valve on the feed line (P).



- > Connect the couplings in the following sequence:
 1. Return line (T)
 2. Control line (LS)
 3. Feed line (P)
- > Activate the fan speed measurement (depending on the available display device or monitor).

Operation



As a rule, the speed only needs to be adjusted prior to the initial start-up and when changing tractors. The adjustment should be checked at the start of the season and, if the area output is large, occasionally during the course of the season as well.

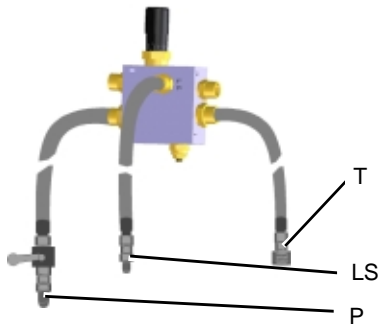
- Open the ball valve on the feed line (P).



Only adjust the speed if the fan is stopped.

- Use the adjusting screw on the 2-way flow control valve to adjust the desired speed.

Uncoupling



- Shut the tractor engine off.
- Close the ball valve on the feed line (P).
- Disconnect the couplings in the following sequence:
 1. Feed line (P)
 2. Control line (LS)
 3. Return line (T)

Safety



- Inspect cables prior to connection and replace any damaged cables.
- The FGS will only operate reliably within the specified temperature range.
- Protect the switch box and plug board against moisture and dirt.
- In case of problems, immediately refer to the "Fault Correction" table to determine whether you can correct the problem yourself. If not, contact Customer Service.
- The specified operating and maintenance requirements must be met.
- Always interrupt the power supply to the FGS during any maintenance work. Failure to do so could result in damage to the FGS.

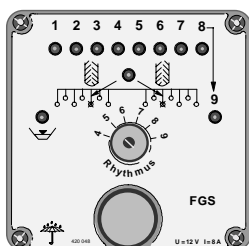
Range of application

The electronic tramlining control system, FGS, allows tramlines to be created.

Proper use

The FGS is only employed in conjunction with seed drills. Any other use is prohibited.

Characteristics



The FGS is available in 2 versions:

Type 1 for rhythms: 4,5,6,7,8,9

Type 2 for rhythms: 3,4S,5,6S,7,8S

The system consists of the following components:

- Switch box
- Plug board
- Cable with connectors

It also permits:

- Monitoring the hopper low level sensor
- V-belt monitoring for V-belt-driven fans

Connecting the FGS



Shut-off valve



Plug board



Retainer

Plug the connectors in



Connector for connection to the switch box



Connector for 12 Volt socket

Prerequisites

- The seed drill is equipped with shut-off or combination valves.
- The plug board has been installed on the machine and the sensors are connected.
- The tractor is equipped with a bracket for the switch box.

➤ Secure the switch box to the bracket.

If the bracket has not been installed:

For tractors with cabins

➤ Select a suitable location that can be easily reached from the seat.

For tractors without cabins

➤ Install the bracket at an angle.

➤ Plug the connector into the appropriate socket.

Performing a calibration test

As a rule, the calibration test is performed in the yard.

Perform the calibration test as described in these operating instructions in the Chapter, ESC, Section, »Performing a Calibration Test«, beginning on page 54.

Tramliningrhythm

The tramlining rhythm defines when tramlines are to be set up on the field. The number of blocked shares is determined by the track and tyre width of the tractor you are using for fertilising and spray work. At the factory, all settings are set to the information you provided at the time you ordered the machinery.

NOTE If the working width of the spraying/fertilising equipment or the tractor's track width changes, please contact your dealer die.

Principals

Before you can set up tramlines, it may be necessary to make alterations to the seed drill. This is always required if the machinery is to be operated with a spraying/fertilising unit with a different width. The installation or modification of shut-off valves is generally required. If these modifications are required, have them performed before setting up the tramlines.

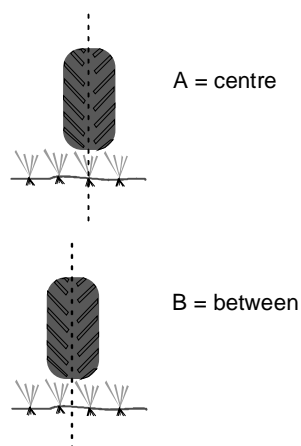
The tramlining rhythm is calculated from the ratio of the spraying/fertilising unit and the seed drill working widths.



Example of calculating the tramlining rhythm	
Field sprayer working width	20 m
Seed drill working width;	4 m
Calculation	$20/4=5$
Resulting tramlining rhythm	5

The working width ratio may also result in a remainder. How the various tramlining rhythms are handled is described in the »Select the rhythm« section of this chapter.

Setting Up Tramlines



Setting tramlines by blocking the shares is dependent

- on the tractor's track width;
- the width of the spraying/fertilising unit, and;
- the row width.

The tractor track width can be dimensioned so that the tractor tyres:

- Drive over the centre of a seed row, or;
- Drive between two seed rows.

Use the graphic in conjunction with the table. The following apply:

- A = Drive over the centre of a seed row.
Please note: Select the number of blocked shares so that the tractor tyres do not drive over any seed row.
- B = Drive between two seed rows,
Please note: Select the number of blocked shares so that the tractor tyres do not drive over any seed row.

NOTE For particularly wide tyres, you will need to block several adjacent shares to set up the tramline.

The table lists possible spraying/fertilising unit track widths dependent on the row width.

Row width [cm]	Seed drill width [m] with (no. of shares)	Spraying/fertilising tractor track width [m]							
		A	B	A	B	A	B	A	
11,1	4 (36)	1,41	1,50	1,59	1,69	1,78	1,88	1,97	
10,3	6 (58)	1,34	1,43	1,55	1,65	1,75	1,86	1,96	
12,5	6 (48)	1,38	1,50	1,63	1,75	1,80	2,0	–	
15,0	6 (40)	1,35	1,50	1,65	1,80	1,95	2,10	–	

Calculate the Rhythm

The table is merely intended as an overview. The table lists some of the most common tramlining rhythms from the seed drill as dependent on the spraying/fertilising unit working width (m), e.g., field sprayers, fertiliser spreaders.

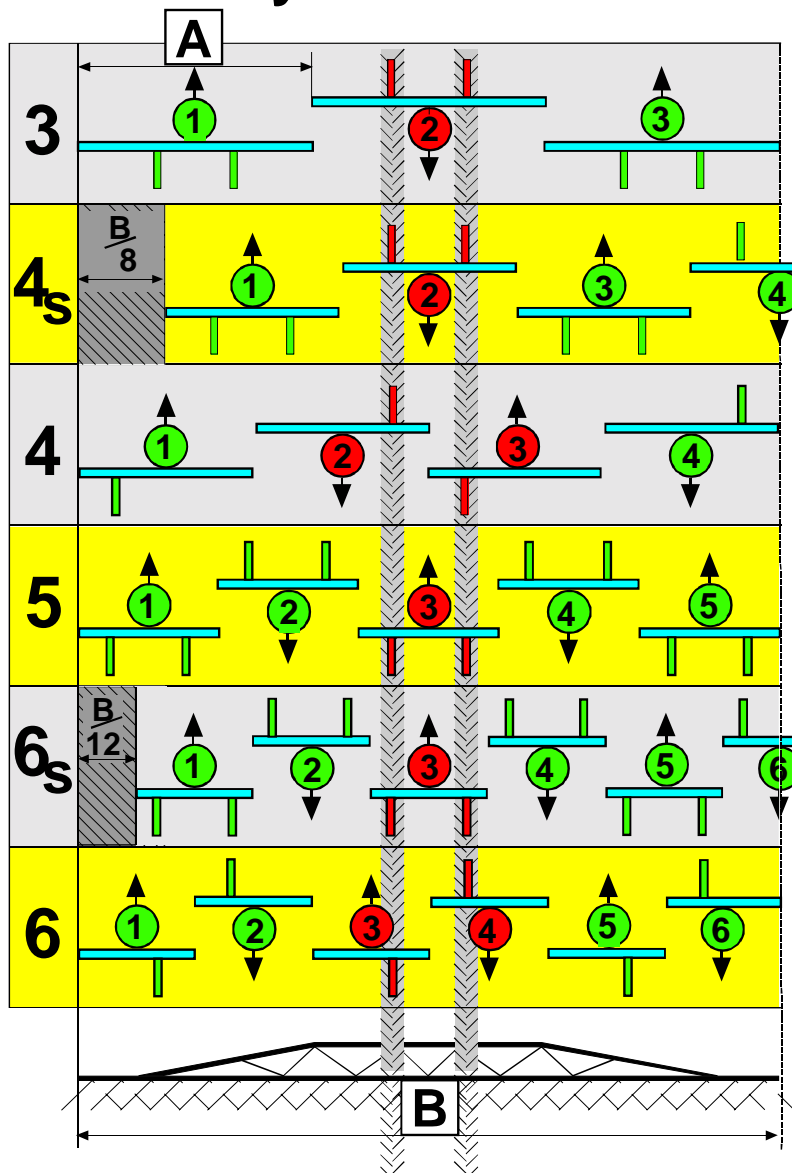
overview

Common tramlining rhythms			
Working width Spraying/fertilising unit (m)	Working width Seed drill (m)		
	4,00	4,50	6,00
12	3	–	2
16	4	–	–
18	4,5	4	3
20	5	–	3,3
24	6	5,3	4
27	–	6	4,5
28	7	–	–
30	7,5	–	5
32	8	–	–
36	9	8	6

The following chart contains several examples of tramlining rhythms.

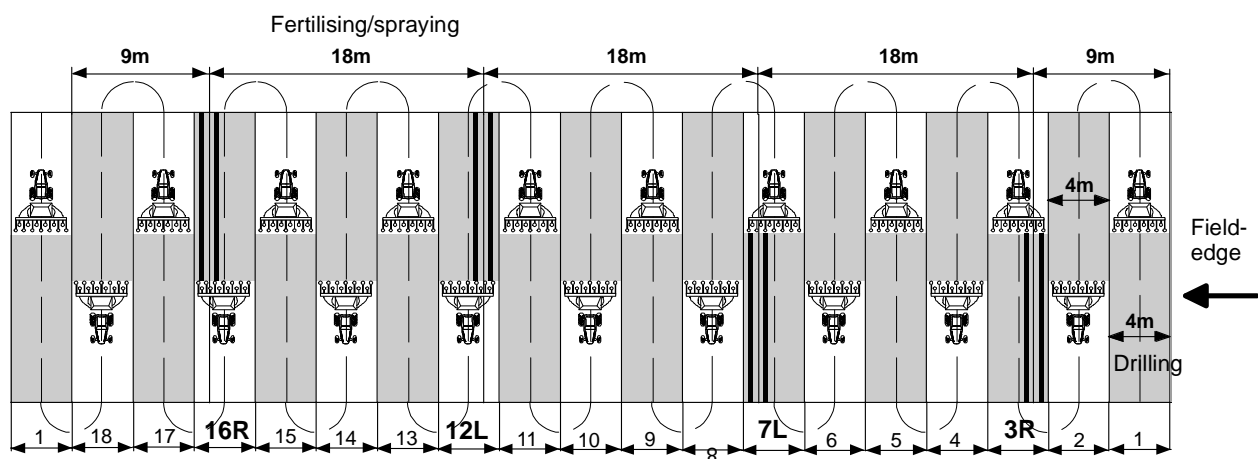
Rhythmus B/A

- A = Sowing
 B = Fertilising / spraying
 B/8 = of the working width of the sprayer, 1/8 or 1/2 the working width of the seed drill
 B/12 = of the working width of the sprayer, 1/8 or 1/2 the working width of the seed drill
 Numbers on the left = tramlining rhythm

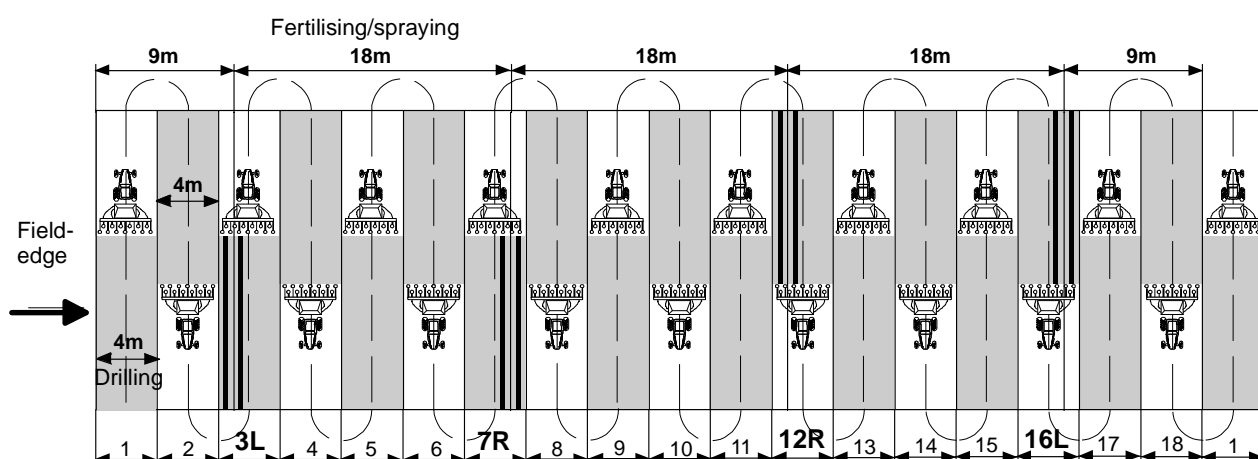


Example of a tramlining rhythm with a remainder:
18 m spraying/fertilising unit
4 m seed drill

Start at the right edge of the field



Start at the left edge of the field



Select the rhythm

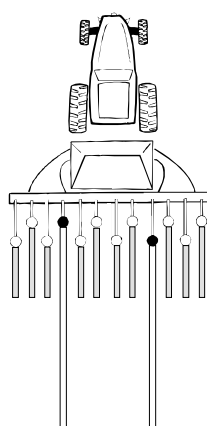
The rhythm is dependent on the working width of the seed drill and the spraying/fertilising unit. It may be

- uneven, or;
- even, or;
- symmetrical, or one (with an "S" after the number, indicating symmetry),
- a special rhythm.

The type of rhythm affects the set up of tramlines.

NOTE As an additional, optical indicator, the diode goes on when tramlines are being set up.

Uneven Rhythms

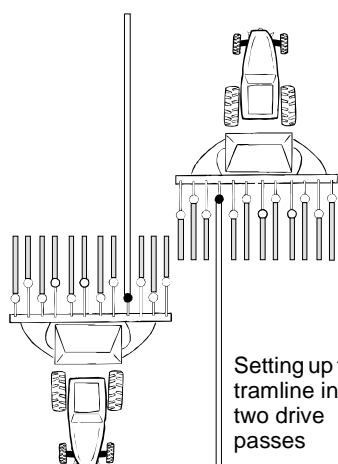


Setting up the tramlines during a single drive

3, 5, 7, 9, 11

During a single drive, the tramline is always set up symmetrically. You can begin cultivation on the right or left side of the field.

Even Rhythms



Setting up the tramline in two drive passes

The tramline is set up during two drive passes. The side of the field at which you must start depends on which side the shut-off valves on your seed drill are mounted (left or right) and on the rhythm with which you intend to work.

4, 8, 12

Start on the same side of the field as the side on which the shut-off valves are mounted.

6, 10, 14

Start on the side of the field opposite to the side on which the shut-off valves are mounted.



If you start on the wrong side of the field, the spraying/fertilising equipment will not fit in the tramlines.

NOTE Setting up the tramlines in two drive passes means that the individual tracks cannot be set up as precisely as with a single drive pass. However, with even rhythms, the tramlines can be set up in a single drive pass. Your machinery must be set up for this at the factory. → Section »Symmetrical Rhythms«, page 38.

Symmetrical Rhythms

Z. B. 2S, 4S, 6S

Symmetrical rhythms compensate for the disadvantage of even rhythms, i.e., having to make two drive passes. Symmetrical rhythms are additionally identified by an "S". During the first drive at the start of the field you must turn off half the working width. The machinery must be set up at the factory for symmetrical rhythms.

- Turn off half the working width and begin drilling on the corresponding side of the field. This pass is not counted in the tramline sequence. A flashing triangle above the associated symbol below the display provides a visual indication that the width has been turned off.
- On the return pass, drill with the full working width. This is pass "1" in the tramline sequence. Do not drive in the track marker track, but along the boundary of the surface cultivated in the first pass.



If you fail to turn half the working width off during the initial pass or you do not drive along the boundary of the cultivated area on the return pass, the spraying/fertilising equipment will not fit in the tramlines.

Special Rhythms

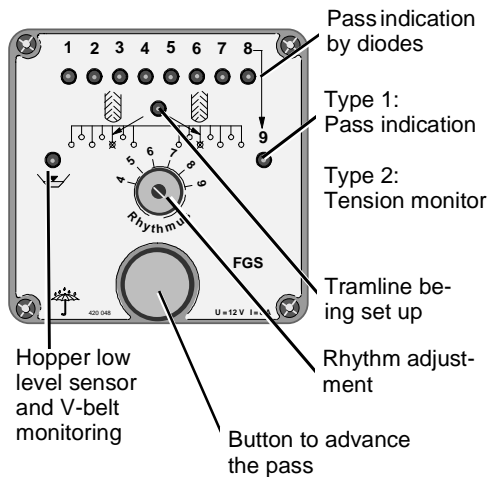
Special rhythms result from a poor ratio of seed drill working width and sprayer/fertiliser equipment working width. The machinery must be set up at the factory for special rhythms.

The side of the field on which you must begin working depends on working width of both the seed drill and the sprayer/fertiliser.



If you start the first pass on the wrong side of the field, the spraying/fertilising equipment will not fit in the tramlines.

Adjusting the Tramline Rhythm with the FGS



- Using a screwdriver, adjust the desired rhythm.
- Unfold the track marker on one side. On the field, the side on which the return pass will be made should unfold.
- Using the button, advance the pass once until diode "1" goes on for the test pass.

Operation

Seed drilling in conjunction with the FGS is described in the »Operation« Chapter, Section »Drilling«.

Safety



- Inspect cables prior to connection and replace any damaged cables.
- The ESC only operates reliably in the specified temperature range.
- In case of problems, immediately refer to the "Fault Correction" table to determine whether you can correct the problem yourself. If not, contact Customer Service.
- The specified operating and maintenance requirements must be met.
- Always interrupt the power supply to the ESC during maintenance work. Damage to the ESC may otherwise occur.

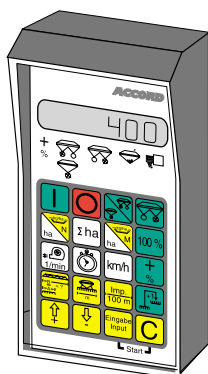
Range of application

The **E**lectrical **S**ower **C**ontroller (ESC) provides economical seed distribution.

Proper use

The ESC is only used in conjunction with seed drills. Any other use is prohibited.

Characteristics



The ESC regulates and controls the essential drilling functions of the seed drill using signals and input data. In addition, the ESC also assumes important control functions, such as:

- Travel-dependent control of the metering devices;
- Monitoring the fan speed, the hopper level, the metering devices, the drive wheel

The system consists of the following components:

- Computer;
- Signal distribution box
- Sensors

It also permits:

- The adjustment of the optimum amounts of seed;
- The start of seeding in inaccessible areas;
- Tramlines;
- Half-width shut-off;
- Metering device monitoring;

Onboard computer

The onboard computer in the tractor cab is used to input and monitor seeding values. In conjunction with the sensors, faults are automatically detected and an acoustic alarm signal is generated.

Signal distribution box

This represents the link between the onboard computer and the sensors. It is mounted on the machinery frame.

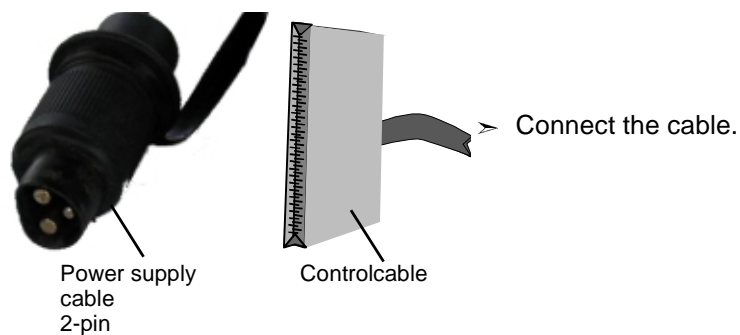
Sensors

A travel sensor determines the distance travelled. It is mounted on the drive shaft.

ESC connection

Prerequisites

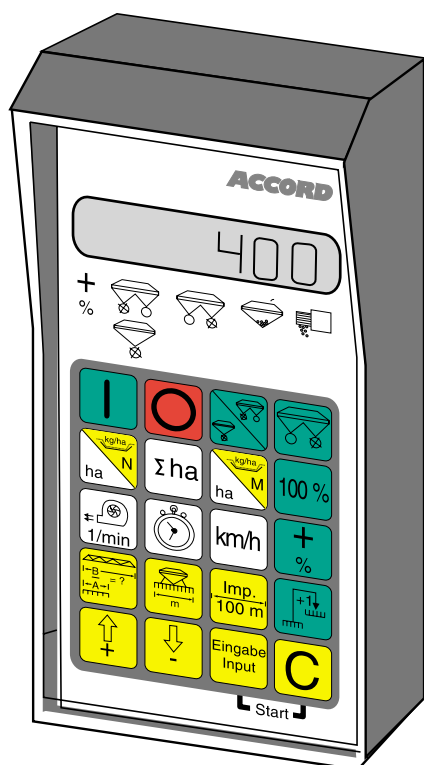
- The ESC and the connecting sockets are completely and properly installed on the tractor



Technical specifications

ESC	
Power supply (V)	12
Fuse (A)	16
Temperature range (°C)	-10 to +60

Keyboard



The ESC keyboard contains:

- Operating keys
to switch the unit on and off;
- Control keys
green keys to activate functions;
- Information Keys
white and yellow keys to call up information during operation;
- Input keys
yellow and white/yellow keys to input, save, and delete machinery data.

The following sections explain the meanings of all the symbols on the keyboard and the display.

Symbols On the Keyboard

The ESC is easy to operate by means of keys.

This section provides all the information concerning the symbols on the keyboard for the:

- Operating keys
- Control keys
- Information Keys
- Input keys

Operating keys

The operating keys switch the ESC



ON (green key)

or



OFF (red key)

Control keys (green)


The control keys are used to implement functions. These keys control the

- Half-width shut-off / Stop shut-off;
- Seed rate adjustment
- Seed rate adjustment cancellation;
- Tramlining rhythm adjustment.



Half-width shut-off / stop shut-off of the left-side metering device

If two metering devices are being used, this key switches the one on the left side off (half-width shut-off). The "off" state is indicated by a

triangle ▼ above the symbol  on the display.. Switching the metering device off interrupts the hectare count.

NOTE If only a single metering device is being used, this key switches it on or off as required (stop shut-off).



Half-width shut-off, right side metering device

This function can only be used if there are two metering devices attached. Press the key to switch the metering device on the right side on and off as required. The "off" state is indicated by a triangle ▼


above the symbol  on the display..

NOTE If only a single metering device is being used, this key is inactive.



Seed rate adjustment

This input increases the original seed quantity / ha in percentage steps (increased output).



A triangle ▼ above the symbol  on the display indicates that a seed rate adjustment has been made.

The prerequisite for seed rate adjustment is the adjustment of the setting screw on the metering device. This adjustment procedure is described in a separate section.



Cancelling the seed rate adjustment

This key is used to readjust the seed rate to its original value, without increased output.

- NOTE:**
- Corrections can only be made if the drive wheel is turning.
 - Keys  and  can only be sequentially pressed after a 10 second delay.



Tramlining rhythm adjustment

The current tramline is manually advanced by one track. Necessary

- To set the correct starting position;
- In case of accidental tramline advance during operation, e.g., as a result of lifting the machinery over obstacles

- NOTE** The desired tramline can only be set by advancing the track. The track cannot be decreased.

Information Keys (white and white/yellow)

These keys to call up information during operation. Information is available about:

- Cultivated area, in ha;
- Total cultivated area per season;
- Currently cultivated area, in ha/hr.;
- Current fan speed;
- Operating hours;
- Working speed, in kph;

At the same time information concerning

- Working speed, in kph;
- Current fan speed;
- Currently cultivated area, in ha/hr.;

is shown, the display also indicates the tramline.

- NOTE** While this information is displayed you can use the green control key to advance the tramline by one track. The change is indicated by a horn sound and the display of the new tramline.

**Cultivated area, in ha**

This key calls up information concerning the cultivated. Measurement automatically stops when the machinery is at rest.

**Total cultivated area, e.g., per season**

Displays the total area cultivated.

**Current area performance, ha/hr.**

This key calls up information concerning the current area performance, in ha/hr. Measurement automatically stops when the machinery is at rest.

**Current fan speed**

Displays the fan speed in rpm.

**Operating hours**

The following functions are available:

Read operating hours

- Press the key once

Use stopwatch function

- Press the key twice: Clock stops.
Press the key again: Timekeeping restarts.

Timekeeping stops and starts automatically when the computer is switched on.

**Working speed, in kph**

Indicates the speed during seeding.

Input keys (yellow and white/yellow)

The input keys are used to display and modify machinery data.

- Display current settings by pressing the associated key.
- Input new values using the arrow keys.
- Save new values using the "Enter Input" key.
- Exit the display by pressing the delete key.



Tramlining rhythm

Displays the stored tramlining rhythm and the tramline.



Working width

Indicates the machinery working width.



Number of pulses / 100 m


Displays the number of pulses measured over 100 m.



Arrow keys

Use the arrow keys to change the current values. Pressing and holding an arrow key will continuously change the display until the key is released.

NOTE

Save new or modified values with  – otherwise the new settings will be lost.



Enter Input

Saves the changed value.



Delete key

Several functions:

- Deletes values entered in the display;
- When used in conjunction with other keys, its function changes, as described in more detail in the following section.

Key combinations with



All combinations involving the "Delete" key initially result in the memory being cleared. Combinations with a dual function will also activate a process.

Dual function combinations



"Cultivated area, in ha" and "C"

Two functions

- Resets the cultivated area in ha memory to zero
- Starts the calibration procedure for normal metering.
This function can only be utilised if the "metering device monitoring" accessory has been installed.

NOTE Preparation for the normal calibration procedure and the calibration test are described in a separate section.



"Cultivated area, in ha" and "C"

Two functions

- Resets the area performance in ha/hr. memory to zero
- Starts the calibration procedure for micrometering
This function can only be utilised if the "metering device monitoring" accessory has been installed.

NOTE Preparation for the micrometering calibration procedure and the calibration test are described in a separate section.

Single function combinations



"Enter Input" and "C"

Resets the



and



memories to zero.



"Total hs" and "C"

Deletes the complete total ha memory for the entire area cultivated during the season.



"Pulses /100 m" and "C"

Deletes the pulses/100 m memory.

Resets the memory and begins counting pulses again as soon as the drive wheel begins turning.



"OFF" and "C"

Resets all memories to zero.

Saving the fan speed



The maximum permissible fan speed is 5,000 rpm!

Before saving, the seed drill must be driven at the nominal PTO speed. Once the PTO speed has been reached, the following fan speeds can be selected for your seed drill:

PTO speed [rpm]	Fan speed [rpm]
1000	4500

NOTE The speeds are identical for both mechanical and hydraulic fan drives.



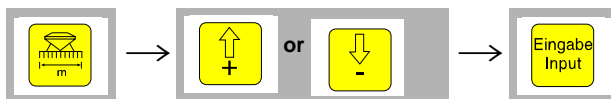
➤ Press the key with the machinery running.
The current speed is displayed..



➤ Press the key.
The displayed fan speed is saved.

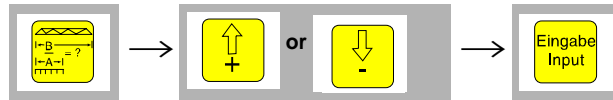
Working width adjustment

The seed drill working width must be provided in order to correctly set up tramlines and to calculate area performance.



Adjusting the tramlining rhythm

The tables and setup diagrams for the tramlining rhythm can be found in the section, »3You now specify the rhythm for your machinery vis the ESC.«.



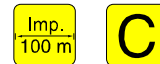
Travel sensor calibration


The travel sensor receives one pulse for each rotation of the drive wheel. In order to assign a specific number of pulses to a distance travelled, the travel sensor must be calibrated. There are two options for doing this:

- Drive along a path that is exactly 100 m long, or;
- Read the values from the table and store them.

Driving a path

- Before starting and while still standing still, delete the "Pulses/100 m" stored in memory.



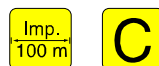
- Drive exactly 100 m then press the  key to save the indicated number of pulses.

Saving table values

The values given in the table depend on the circumference of your seed driller's drive wheel and on the soil conditions. The actual soil conditions may result in different values. Calibration by means of actually driving across the field is more accurate.

Working width (m)	Drive wheel	Pulses/100 m
4.00	Star wheel	42
4.50	Star wheel	42

- While standing still, delete the "Pulses/100 m" stored in memory.



- Enter the desired value from the table.



- Save.



Display

The display shows the various symbols and their related numbers.

Symbols on the display provide information about:

- Operating conditions;
- Machinery settings
- Fault

Numbers on the display provide information about:

- Machinery data
- Tramline position

Symbols at the bottom of the display provide information about:

- Current machinery settings;
- Alarms

NOTE Some of the display symbols only appear when you are actually working with the ESC.

Symbols on the display

Arrow, circle, and triangle indicate different operating conditions, machinery settings, and faults.

Arrow



Switching the ESC on brings up an arrow on the display. The ESC is now operational.

Circle



A flashing circle below the arrow indicates that the drive wheel is turning. The machinery is in its operating position.

Triangle

Triangles on the display always appear in conjunction with the symbols at the bottom of the display. The triangles indicate machinery settings or, if they are flashing, indicate faults.



- Reference triangles = Display of current machinery settings



- Flashing triangles = Display faults

NOTE The symbols at the bottom of the display are explained in the subsequent sections.

Numbers on the display

Operating data

This contains all the information you can call up by means of the white or white/yellow keys.

Machinery data

Contains all the information you can call up with yellow keys

Tramline position

The number after the vertical dotted line indicates the current tramline position. When a tramline is set, this number flashes.

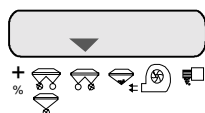
Symbols at the bottom of the display

The symbols at the bottom of the display are associated with the reference and flashing triangles and provide information about:

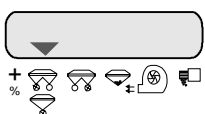
- Current machinery settings;
- Fault

Machinery settings

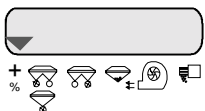
A triangle above the symbol indicates the current machinery settings.



Right side (rear) metering device switched off.



Left side (front) metering device switched off.



Seed rate adjustment set to increased output.

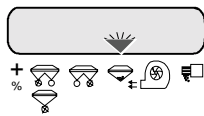
Alarms

Alarms may be generated during operation or when the ESC is switched on. Visually, they are indicated by flashing triangles above the symbols at the bottom of the display.

- Hopper low level alarm
- Fan speed alarm
- Metering device drive alarm

NOTE:

- Alarms cannot be manually activated.
- Generation of an alarm also produces an acoustic warning.

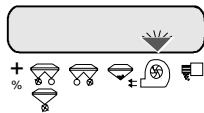


Hopper low level alarm

A triangle flashes above the hopper level symbol on the display. In addition, a horn sounds every 2 seconds to provide an acoustic alarm.

- Hopper reserves in use
- Residual quantity in the hopper below minimum level

The alarm switches off when the hopper is refilled.

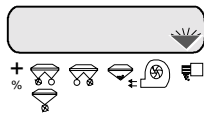


Fan speed alarm

A triangle flashes above the fan speed symbol on the display. In addition, a horn sounds every second to provide an acoustic alarm.

- The fan speed has dropped 10% below the saved lower fan speed limit.
- A drop in fan speed can result in seed blocking the seed delivery tubes.

The alarm switches off once you increase the fan speed.



Metering device drive alarm

A triangle flashes above the metering device drive symbol on the display. In addition, a horn sounds at given intervals to provide an acoustic alarm.

If the metering device drive is interrupted for longer than 5 seconds during stop or half-width shut-off, a triangle flashes above the fan speed symbol on the display. In addition, a horn sounds 5 times after operation is restarted to provide an acoustic alarm

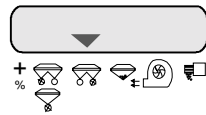
- The metering device drive has been interrupted.

The alarm switches off once the problem has been corrected.

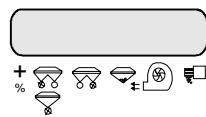
Calibration test with the ESC

General

The calibration test is essential for optimum cultivation. The prerequisites for performing a calibration test include:



- All required data must be entered.
- For seed drills equipped with a metering device, – turn off the second seeding shaft (right-hand metering device).



- For seed drills equipped with two metering devices, – turn the second seeding shaft on.

Please note the following before starting the calibration test:

- NOTE:**
- The calibration test can only be performed if the machinery is retracted and the tractor and PTO shaft are switched off.
 - For seed drills with two metering shafts, the calibration test starts with the left (front) metering device.
 - To avoid inaccuracies, perform a calibration test with each metering device.
 - Perform a new calibration test every time you change seed type.
 - The factory-defined default value for the micrometering system is "ON". Change these settings only when you wish to operate with normal metering.

If you are working with normal metering you must switch micrometering for the seed drill off as described in the chapter, »Preparation Work - Drilling«, beginning on page 121..

NOTE However, the micrometering system on some seed drills is extremely difficult to access. In this case, bypass the deactivation:

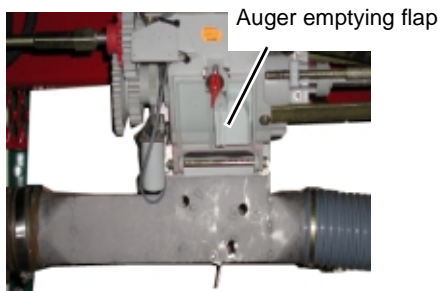
- Leave the micrometering system turned on.
- Enter a larger setpoint value than indicated at the metering device.
- Perform one or more calibration tests for comparison purposes.

The micrometering must only be switched off at the seed drill if the quantity of fine seed being sown is more than 15% below that desired with the metering device fully opened, as explained in chapter, »Preparation Work - Drilling«, section, »Micrometering off«, page 121.

Performing a Calibration Test



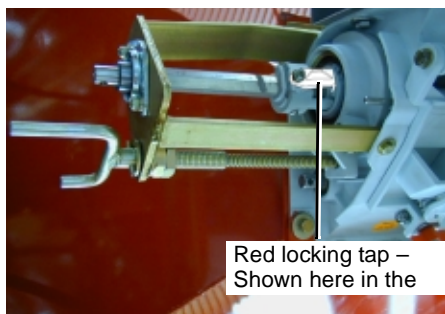
- For the calibration test, the machinery must be in the transport position, with wheels chocked to prevent rolling, and sides secured against extension.
- Inspect the seed hopper for foreign objects.



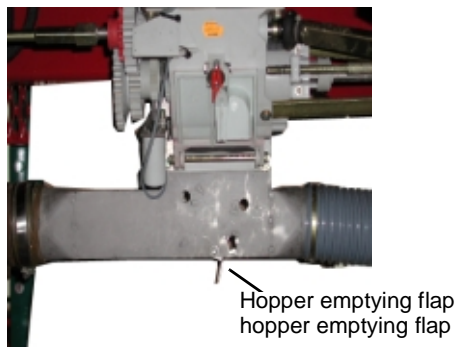
If you are using two metering devices, you must perform the calibration test on each one.

Before you can begin the calibration test:

- Close the auger emptying flap on both metering devices.



- Place the red locking tap in the "Fine" or "Normal" seed position.



- Place a catch pan under the metering device.
The catch pans must be large enough to hold the seed generated during the calibration.
- Open the hopper emptying flaps.

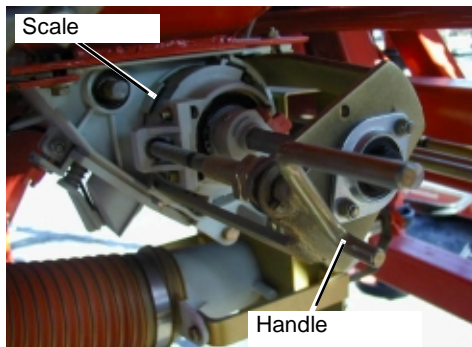
Now use the ESC to prepare the calibration test.

You must use the correct adjustment value for your particular seed in order to perform the calibration test. → »Preparation Work - Drilling«, section. »Determine the adjustment value«, page 119.

- Read the adjustment value for normal or fine seed from the table.

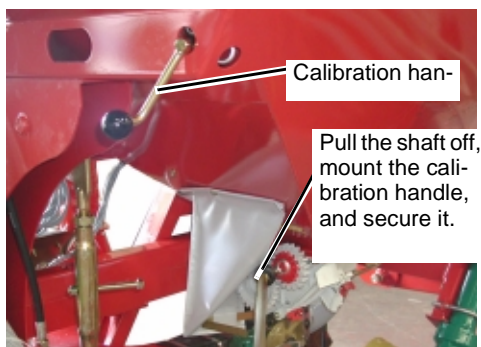
For example, the adjustment value in the table is 50 mm.

- Using the handle, adjust this value at both metering devices. Adjusting to this value changes the metering device cell width.



There must be no seed in the metering device if you are decreasing the cell width.



- Add sufficient seed to the hopper for the calibration test.
Please note: The hopper low level sensor in the seed hopper must be covered by at least 3 cm of seed.
- Remove the calibration handle from its retainer.
- Pull the shaft off and mount the calibration handle on the shaft. Secure with a cotter pin.



The seed drill is now ready for the calibration test. Perform the calibration test according to the machinery settings for normal or micrometering.



Normal metering

For normal metering, the calibration test is performed for 1/10 ha.

-   press simultaneously.
- Carry out 85 revolutions with the calibration handle mounted on the metering device. With metering device monitoring: A horn will sound after 85 revolutions.

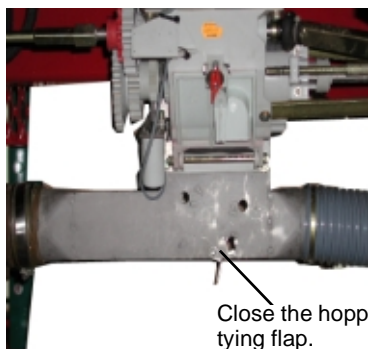
Micrometering

For micrometering, the calibration test is performed for 1/10 ha

-   press simultaneously.
- Carry out 86 revolutions with the calibration handle mounted on the metering device. With metering device monitoring: A horn will sound after 85 revolutions. Continue for one additional revolution.

Calibration test evaluation

- NOTE:**
- The calibrated quantity of seed represents the amount sown for 1/10 ha.
 - We recommend performing the calibration test at 1/10 ha for sowing quantities up to approx. 100 kg/ha, and at 1/20 ha for larger quantities. At 1/20 ha, halve the number of revolutions.



Close the hopper emptying flap.

At the conclusion of the calibration:

- Close the hopper emptying flaps.
- Combine the seed from both metering devices and weigh it.

Failure to close the hopper emptying flap will result in the seed falling directly on the ground during sowing, and not being passed to the seed coulters.

- NOTE:**
- The quantity of calibrated seed does not necessarily correspond to the value in the table. One reason for this is the difference in the thousand grain weight.
 - For deviations in the seed quantity:
 - Convert the difference to the quantity in the table into %.
 - Correct the adjustment at the metering device up or down by this percentage. When doing this, make sure there is no seed in the metering device if you are decreasing the cell width.

Electrical Seed Rate Adjustment

Electrical seed rate adjustment is only suitable for normal seeding. Once set, the additional seed quantity can easily be added or shut off via the ESC.

Before starting work you must:

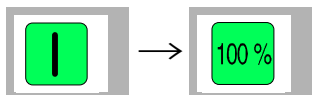
- Set the base quantity (100 %);
- Set the desired additional quantity (+ x%);
- Adjust the adjusting setting screw
- Check the additional quantity by running a calibration test.

NOTE The metering device cell width can be increased by a maximum of 20 mm when using the seed rate adjustment.

Base quantity

The base quantity is the amount of seed you wish to apply per ha. You have previously performed the adjustment on both metering devices and have checked them by performing a calibration test.

➤ Adjust the base quantity at the metering device.



The ESC is now switched to a base quantity = 100 %.

➤ If necessary, repeat the calibration test as described in the previous chapters.

Set the additional quantity

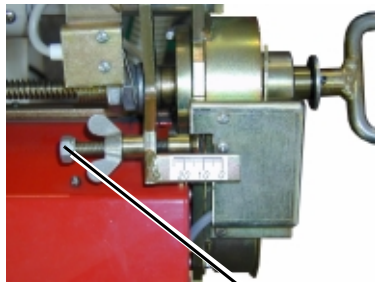
Determine the additional quantity adjustment value as follows:



Additional quantity calculation example	
For a seed quantity of Base setting at the metering device	100 % 50 mm cell width
Desired additional quantity	+ 10 %
Calculation	50 mm x 10 % /100
Result: Additional quantity adjustment value	+5 mm cell width
After switching on the seed rate adjustment	55 mm, new cell width

- NOTE:**
- Maximum cell width
Do not exceed a maximum cell width of 110 mm for the base setting + cell width for the additional quantity.

Adjust the adjusting setting screw



Adjusting setting screw for seed rate adjustment



Now set the calculated value for the additional seed at the adjusting setting screw on the seed rate adjustment.

- For this example, set the adjusting setting screw for seed rate adjustment to 5 mm on the scale.

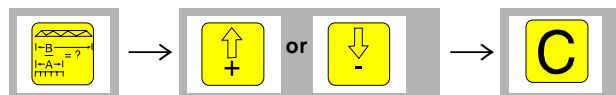
- NOTE:**
- Do not exceed the maximum cell width of 110 mm, including the seed rate adjustment.
 - Increasing the cell width
After the adjusting setting screw has been adjusted and the electrical seed rate adjustment is switched on, the cell width is automatically increased to the specified value.

Checking the additional quantity

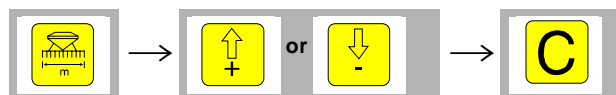
After adjusting the adjusting setting screw, check whether the additional quantity is actually being output.

-  Press.
- Fill the hopper.
- Use  to switch on the additional quantity..
- perform a calibration test.
→ in this chapter, section, »Calibration test with the ESC«, beginning on page 53

3 You now specify the rhythm for your machinery vis the ESC.
Use the following key combination for the spraying/fertilising unit width:



Use the following key combination for the tramlining rhythm:



A number appears on the display. The following table indicates which

number is assigned to which tramlining rhythm.

Number on the display	Rhythm	Start on which side of the field?
0		No tramline
2	2	Any
3	3	Any
4	4	Any
5	5	Any
6	6	Any
7	7	Any
8	8	Any
9	9	Any
10	10	Any
11	11	Any
12	12	Any
14	14	Any
Symmetrical rhythms		
2-5	2-S	Any
4-5	4-S	Any
6-5	6-S	Any
8-5	8-S	Any
10-5	10-S	Any
12-5	12-S	Any
Rhythms with remainders		
15	15m/8m and 20m/6m	Right
16	15m/8m and 20m/6m	Left
18	18m/4m	Left
19	18m/4m	Right
20	20m/6m and 10m/3m	Left
21	20m/6m and 10m/3m	Right
22	18m/12m	Left
23	18m/12m	Right
24	24m/4.50m	Left
25	24m/4.50m	Right
26	27m/6m	Left
27	27m/6m	Right
28	28m/8m and 21m/6m	Left
29	28m/8m and 21m/6m	Right
30	30m/4m	Left
31	30m/4m	Right
54, 55, 60, 61, 141, 181	Not applicable to seed drills	

Operation

Drilling in conjunction with the ESC is described in the »Operation« chapter, section, »Drilling«.

Safety



- Inspect cables prior to connection and replace any damaged cables.
- The ESA only operates reliably in the specified temperature range.
- Always turn the RPM alarm on during drilling, otherwise the metering device can start while the fan drive is off.
- In case of problems, immediately refer to the "Fault Correction" table to determine whether you can correct the problem yourself. If not, contact Customer Service.
- Always interrupt the power supply to the ESA during maintenance work. Damage to the ESA may otherwise occur. Area of application

The **E**lectrical **S**ower **D**rive (ESA) provides economical seed distribution in conjunction with satellite navigation systems.

Proper use

The ESA is only used in conjunction with seed drills. Any other use is prohibited.

Characteristics



The ESA regulates and controls the essential drilling functions of the seed drill using signals and input data. A large number of these signals activate and drive the metering device. Among other things, ESA regulates the speed of the metering shaft during drilling, while also performing important control functions, such as:

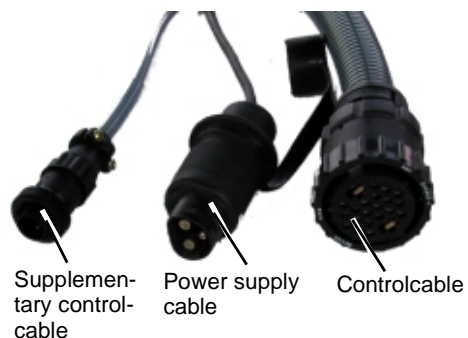
- Travel-dependent control of the metering devices;
- Monitoring the fan speed, the hopper level, the drive wheel, the speed.

It also permits:

- Calibration problems to be stored;
- The adjustment of the optimum amounts of seed;
- The start of seeding in inaccessible areas;
- Tramlines;
- Half-width shut-off;
- Metering device shut-off;
- Checks of sensors and motors.

ESA Connection

Prerequisite: The ESA and the connecting sockets are completely and properly installed on the tractor.



➤ Connect the cable.

Technical specifications

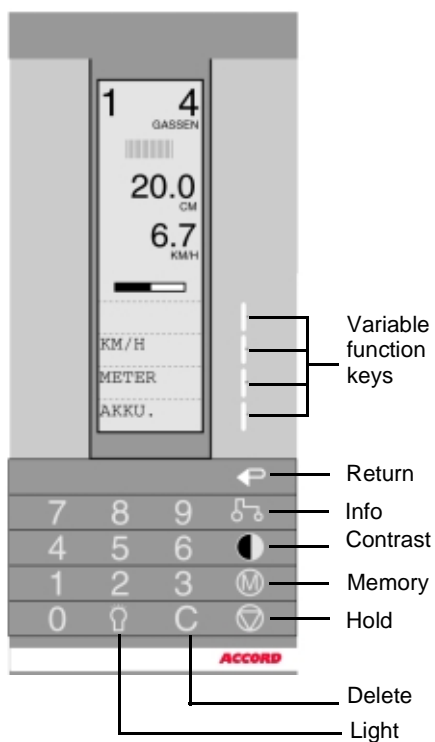
ESA/ESC	
Power supply (V)	12
Fuse (A)	30
Temperature range (°C)	-5 to + 50

Device Overview

Keyboard

The ESA keyboard contains

- Keys with a fixed function, e.g., symbol keys, numeric keys
- Variable function keys



The following sections explain the meanings of all the symbols on the keyboard and the display.

Symbols On the Keyboard

Fixed Function



Info key

Information is displayed

- KH / H
- D.SHAFT 1 and 2
- HA / H
- HA
- HA LEFT



Contrast key

Good contrast – Recommended setting, approx. 50. Observe the contrast field: The lines and squares must be easily identifiable. After selecting contrast adjustment, the following contrast settings can be performed on the display:

- CONT +
Increases the contrast
- CONT -
Reduces the contrast
- LIGHT ON / OFF
Turns the display and keyboard illumination on or off.
A radiating light bulb image on the display indicates that the illumination is on. The light button can also be used to turn the illumination on and off.



Memory key

- Save function: permits the currently displayed page to be saved once, and, for the most recently saved page, is indicated by an **M** on the display.
- Calls up the most recently saved page. The call-up deactivates the save mode.

Please note:

SYSTEM menu pages cannot be saved. Called up pages cannot be saved from within the SYSTEM menus.

0-9 Numeric keys



Light key

Turns the display and keyboard illumination on or off.
The contrast key also be used to turn the illumination on and off.



Delete key

Deletes input values and totals count values.

Variable Function

Function key

This allows

- Set values to be displayed;
- Make selections in the menu.



Return key

with several functions:

- Confirms input
if no "OK" button appears on the display for confirmation;
- Moves you back to the previous display;
- Permits status displays to be shown after input;
- Moves you to an additional display after all information has been printed.

Display

Please note:

Sometimes the display symbols are not immediately visible and only appear when you are actually working with the ESA.

Symbols on the Display

With an information function



- Operating speed
- Mileage
- Supply voltage



- Drilled seed amount
- Remaining seed in the hopper
- Metering shaft speed
- Seed rate adjustment
- Manual tramline sequencing
- Fan speed
- Metering device(s) ON/OFF



- Cultivated area
- Area performance
- Remaining area



- Stopwatch
- Calculated completion time
- Time
- Date

Tramlines



Do not lay down tramlines



Lay down tramlines



Flashing arrows

on the right and left of the tramline diagram are used for monitoring. They indicate that the metering device is being driven.

With other functions

Select



Goes through all information on the display in the direction indicated by the arrow and marks them for selection.



Please note:

Even without being selected with arrows, SELECT, or SCROLL, the first term on an operator display is always marked for selection.



Goes through the calibration tests in the direction indicated by the arrow (3, max.).

Please note:

Stored calibration tests are not marked.

SELECT Used to make a selection

More pages

A note indicating additional pages may appear in several ways on the display. No matter how it appears, it always indicates that, in this menu, there are pages before or after the current page containing additional information:



- Menu input: → Calibration test. More pages

eg **2/3**

- Menu input: → Calibration test.
2 = Number of saved calibration tests.
3 = Total number of possible tests

- Menu input: → Tasks:
1 = Page 1
6 = of a total of 6 pages

NEW PAGE • Task area: selects additional pages in the menu.

SCROLL • All areas: selects additional pages in the menu.

Miscellaneous

OK Confirm input or display status.

NEW CALIB. Sets up a new calibration test.
Please note:
If 3 calibration tests already exist, one of the existing ones will be over-written when you save a new calibration test.

HI und LO Menu system:
Used for sensor checks for pulse queries.



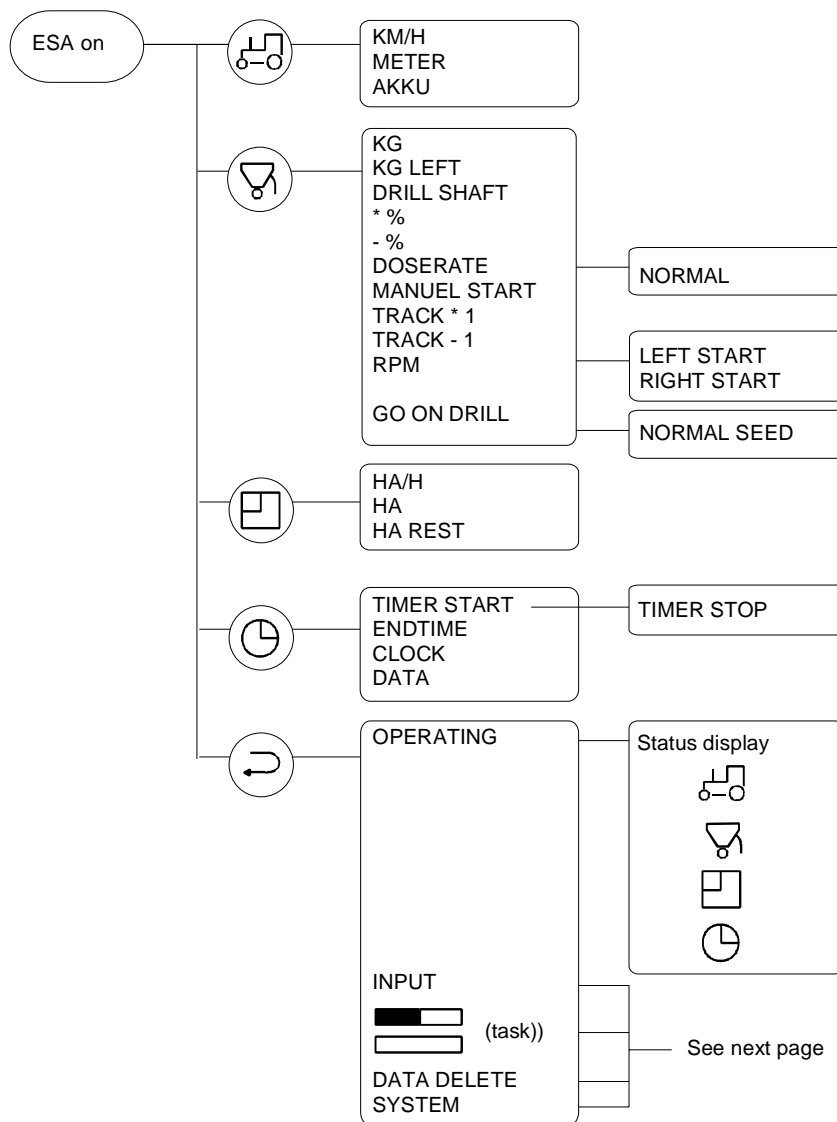
= HOLD **Flashing HOLD on the display**

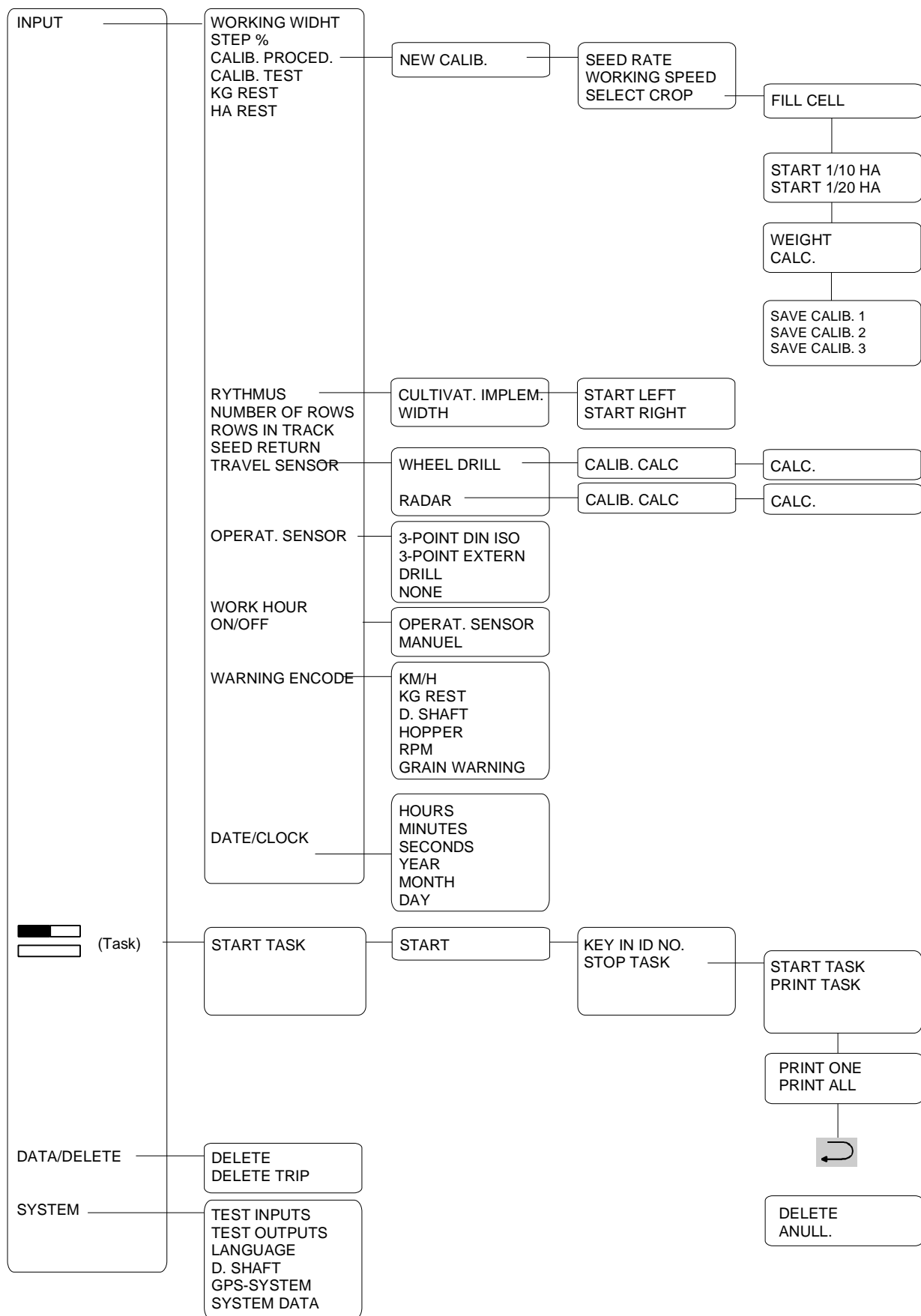
Depending on the operation sensor selected, a flashing HOLD can have the following affects:

- For the "DRILL." operation sensor:
Metering device drive stops.
- For the "NONE" operating sensor:
Metering device drive continuous running.

Overview of the Menu Structure

The following pages provide an overview of the ESA menu structure.





This chapter contains

- Operating information
- Operator menus
- Tramlining rhythm
- Calibration test
- Operation

Operating information

Turning on the ESA



Start-up
from the
console

In order to subsequently operate the ESA, make sure it is properly connected with:

- A control line;
- A line from the signal distribution box to the ESA;
- Three-prong plug-in connection to the tractor supply voltage.

- Switch the PTO shaft off.
- Switch the ESA on.

Alarms

The ESA first tests the connected electronic surroundings. While this takes place, you may receive one of the alarm messages shown here, accompanied by an audible alarm.

KM / H

The upper or lower working speed limit violated. Enter new values via the keyboard. Delete by pressing "C".

KG LEFT

The remaining seed in the hopper has dropped below the defined residual limit. Add seed or enter a new KG LEFT value.

D. SHAFT

Indicates that the metering shaft is no longer turning. Check whether a second metering shaft has been turned on, even though you only use a single one. In this case, deactivate the second metering shaft. HOPPER

Hopper reserves being used.

Remaining seed in hopper now below the specified minimum level. Add seed or enter a new KG LEFT value.

GRAIN

Currently not available.

RPM

Upper or lower fan speed limits violated.

Specify and enter a fan speed for seeds. Maximum speed: 5,000 rpm; minimum speed: 3,500 rpm. Under no circumstances may the actual speed go above or below this range. Too slow a speed can result in seed clogs in the seed delivery tubes.

Always turn an RPM alarm off prior to the calibration test, otherwise the system cannot perform the desired test.



Always turn the RPM alarm on during drilling. If the alarm is not switched on metering device can start while the fan drive is off.

Alarm Function Deactivation

You can deactivate all the alarms from the same menu in order to work with the computer without being interrupted by alarms.

- > First, confirm the displayed alarms with "OK".
- > Then turn the alarms off with



- > Repeat this sequence for each alarm.

NOTE The hopper or grain alarm are part of the accessory equipment package. If these accessories are not installed, but the alarms have been activated, an acoustic alarm will sound. In this case, deactivate these alarm functions.

After switching the alarms off, use the RETURN key to return to the starting menu.

Alarm Function Activation

Do not switch the alarms you feel you may need on until you have completed your data input.

Messages

If your data input was incorrect, one or more error messages will appear on the display. They will be accompanied by an acoustic alarm.

- Check you input and make the necessary corrections.

Work rate exceeded.

→ The actual seed value is too small compared to the setpoint.

Remedy:

- Use the calibration test to recalculate the seed quantity. → beginning on page 99.
- Stay within the calculated speed range during operation.

Calculated cell width illegal.

→ Application rate too high or too low.

Remedy:

- Determine the correct application rate from the table, then enter this value. The calibration test calculations will determine the correct cell width. → beginning on page 99.
- Depending on the information from the ESA:
Turn the micrometering system on or off. The factory-defined default value for the micrometering system is "ON".

Combination not possible.

→ The specified tramline/rhythm combination is not possible.

Remedy:

- Check the settings. → beginning on page 79.
- Select a suitable combination.

Dose rate exceeded or insufficient.

→ There may be two reasons for this message:

- The second metering device has been activated, although you are using only one.

Remedy:

- Turn the second metering device or shaft off. → beginning on page 96.

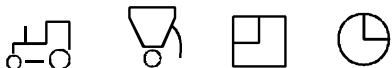
Operator Menus

The operator menus:

- Operation
- Input
- Tasks;
- Delete data;
- System;

are already familiar to you from the overview. In the following sections they are explained in greater detail under:

- General Information
Here you will find an overview of the selected menu.
- Symbols and Terms
During processing, symbols and terms appear on the display. These are listed and explained in the table.
- Practical Example
The practical examples provide task descriptions, then offer a quick overview to show you the shortest path to the displays in which you can make the necessary settings.
This quick overview also employs the terms, "Symbol Display" and "Operator Display", that are explained below.

Symbol display	Display view after switching on the ESA with the symbols
	
Operator display	Display view after the symbol display and containing the individual menus: <div> <div>OPERATION</div> <div>INPUT</div> <div> <div></div> <div></div> </div> <div>(task)</div> <div>DATA / DELETE</div> <div>SYSTEM</div> </div>

NOTE Entries for tramlining rhythm or calibration tests are given after the practical example for the "SYSTEM" menu item.

Operation

General Information






This provides you with an overview of:

- Information regarding tractor performance during operation;
- Individual seed drill functions;
- Information concerning the area performance;
- Time and date.




Symbols and Terms

This table explains the symbols and terms you will encounter in the "OPERATION" menu.

Continuously recurring symbols and terms are explained on page 65.

Display symbols		Information regarding tractor performance	Selectable
		Seed drill functions	
		Area performance	
		Time and date	
	KM / H	Working speed	Display
	METRE	Mileage, in meters	
	BATT	Supply voltage to the computer	



	TRACK +1 TRACK -1	The current tramline is manually advanced or decreased by one track. Necessary <ul style="list-style-type: none"> To set the correct starting position; In case of accidental tramline advance during operation, e.g., as a result of lifting the machinery over obstacles 	Switch
	RPM	Fan speed, in rpm. Monitors the fan speed and generates an alarm if the speed exceeds or drops below the specified value, if the alarm is activated. <ul style="list-style-type: none"> Change the fan speed in the menu: ENCODE → alarm input → RPM In the same menu: Alarm activation / deactivation 	Display Enter turn on or off
	GO ON DRILL	If activated ahead of obstacles: <ul style="list-style-type: none"> The track marker can be raised; The metering device drive continues running; The tramline track is not advanced; Display switches to "NORMAL DRILL" "HOLD" flashes in the lower display area. 	Activate
	G on the display	Both track markers have been retracted. The electric motor is switched off. Metering stops.	Display
	Flashing HOLD	Refers to the incremental increase in the tramline track. Turn on or off <ul style="list-style-type: none"> with the old key on the keyboard, or by selecting and switching off "NORMAL DRILL". 	Turn on or off
	NORMAL DRILL	The function to incrementally increase the tramline track is switched off.	Deactivate
	HA / H	Area performance per hour.	Display
	HA	Currently cultivated field area.	
	HA LEFT	Area remaining to be cultivated. This display is only possible if you entered the size of the field area before beginning sowing. Menu ENCODE → HA LEFT	Display Enter
	TIMER	Stopwatch that can be manually started and stopped.	Display
	END TIME	Calculated time current operation will be concluded. "END TIME" can only be displayed if Information concerning HA / H and HA LEFT is available.	Display
	CLOCK DATE	<ul style="list-style-type: none"> Current time Current date Both can be changed in the Menu ENCODE → CLOCK / DATE	Display Enter

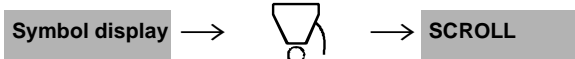
Practical Example



The "Tractor", "Area", and "Clock" menus are self-explanatory, the practical example will therefore confine itself to the area of the seed drill.

You would like to determine the sowing speed range in which you need to operate if you use a different amount of seed (e.g., 50 kg / hectare).

NOTE The sowing speed range changes as dependent on the specified amount of seed.



1	6	SEED RATE	SEED APPLICATION SPEED RATE
TRACK-NO		50.0	MIN
		KG / HA	
XXX			2.3
KG / HA			KM / H
0	0		MAX
D. SHAFT			11.3
			KM / H
+0%		OK	OK
-0%			
SEED RATE			
SCR-OLL			

If you cannot operate in the indicated sowing speed range, perform another calibration test. → Chapter »Performing a Calibration Test« page 99.

ENCODE

General Information

Here you enter data required to control the metering device drive. Save the individual entries with the Return key.

You can display the status of your input after each entry by pressing the Return key. This allows you to check that all the values you have entered are correct.

Calibration test and determination of the tramlining rhythm are described in detail in a separate chapter, using a practical example in the "SYSTEM" menu.

Symbols and Terms


This table explains the symbols and terms you will encounter in the "ENCODE" menu.

Continuously recurring symbols and terms are explained beginning on page 65.

"ENCODE" display	WORKING WIDTH	Enter the seed drill working width in cm.	Enter
	STEP IN %	The entry produces an incremental increase or decrease of the specified amount of seed in % increments. The increments are identical for both "+ %" and "- %". In case of an incorrect setting, an error message indicating that the operating range has been exceeded is generated (motor operating outside the speed range). In this case, entered values are no longer considered for the operation.	Enter
	CALIB. PROCED.	After selection, you can use the follow-on menus to: <ul style="list-style-type: none"> • Define the settings for the calibration test; • Display stored calibration tests; • Perform a new calibration test. The calibration test can only be performed if there is a sufficient amount of seed in the seed hopper. Note: The calibration test is described after the "SYSTEM" menu.	Select
Display the stored calibration test	Display the seed type	You can read the selected seed type here.	View
	KG / HA	Displays the kg / hectare value determined during the calibration test.	
	KM / H	Displays the input performance / hour.	
	CELL	Displays the cell width (adjustment value) determined by the calibration test, in mm. This is the value you set at the metering device.	
	FINE NORMAL	Input specifying fine or normal seeds.	
	MICMETRE ON MICMETRE OFF	Indicates whether the micrometering system at the metering device is turned on or off.	
	1 / 3	The information differs depending on whether and how many calibration tests you have saved. 1 = Number of saved tests 3 = Total number of tests	
	NEW CALIB.	After selection, you can use the follow-on menus to enter the settings for a new calibration test.	Call up

Displays a new calibration test	SEED RATE	Amount of seed, in kg / hectare.	Enter
	WORKING SPEED	Enter the average speed with which you wish to work. or confirm the default setting.	Enter or confirm
	SELECT CROP	This calls up a list of seed crops from which you can select the desired type of seed. If your particular seed is not listed, select one with similar characteristics.	Select
	SET VALUE MM	Displays the calculated setpoint value for the metering device. Set this value at the metering device.	Confirm
	DRILL READY	The seed drill is ready for the calibration test.	Display
	FILL CELL	Confirming this prompt starts the metering device and fills the cells.	Confirm
	Flashing WAIT	Flashes until the procedure is finished.	
	START 1 / 10 HA	Starts the calibration test with 1 / 10 hectare of the area to be calibrated.	Start
	START 1 / 20 HA	Starts the calibration test with 1 / 20 hectare of the area to be calibrated.	
	PAUSE	Interrupts the calibration test.	Activate
	RESTART	Continues the calibration test.	
	WEIGHT GRAMME	Enter the seed weight of the sample.	Enter
	Flashing CALC.	Calculates the sowing speed range and displays the min. and max. km / hr values.	Activate
	SEED APPLICATION SPEED	Displays min. and max. km / hr. after you enter the seed weight of the sample and perform the calculation.	Display
	SAVE CALIB1 SAVE CALIB2 SAVE CALIB3	Saves the values from the respective calibration test. After saving, the test can be called up via Menu ENCODE → CALIB. PROCED.	Activate
Displays the calibration test	CALIB. TEST	This test simulates a cultivation procedure using all the currently set and calculated values. Here you can check whether the amount of seed at the start agrees with the amount of seed determined by the calibration test.	Select
	TEST CALIBRATION AREA:	Enter the area to be used for the test, e.g., 0.1 hectare. The amount of seed corresponding to the area must be captured.	Enter
	START	Starts the test of the calibration test.	Start
	DONE	Test completed.	Confirm
"ENCODE" display	KG LEFT	The amount of seed remaining in the hopper, in kg, can only be displayed if you filled the hopper before beginning work. Enter the amount of seed, in kg, here. When refilling the hopper, take the remaining seed in the hopper into account. Example To calculate "KG LEFT" 100 kg remaining in the seed hopper, 400 kg added = 500 kg left	Display Enter

"ENCODE" display	HA LEFT	Displays the area still to be drilled. Calculates the difference between the area already drilled and the total area. The remainder is the HA LEFT. The area to be cultivated is entered in this menu.	Display Enter
	RHYTHM	After selection, you can use the follow-on menus to: <ul style="list-style-type: none"> • Define the settings for the calculation of the tramlining; • Specify that cultivation is to begin on a specific side of the field; • Display the information for the rhythm calculation as well as the results of the calculation. Note: The tramlining rhythm is described in greater detail after the "SYSTEM" menu.	Select
Displays the rhythm	CULTIVAT IMPLEM. WIDTH	This is required in order to calculate the tramlining rhythm and set up the tramlines. Input in cm. Entering "0" = No tramlines will be set up.	Enter
	VALVE LEFT	The blocked share is in the left portion of the seed drill. Start cultivation on the right side of the field.	Confirm
	VALVE RIGHT	The blocked share is in the right portion of the seed drill. Start cultivation on the left side of the field.	Confirm
	SYMMETRICAL	After selecting, new display with the information entered to this point and the tramlining rhythm, followed by an "S" for symmetrical. Tramlines are set up during cultivation.	Select
	START LEFT START RIGHT	Cultivation starts on the left side of the field. Cultivation starts on the right side of the field. After selection, a new display showing the current information and the calculated tramlining rhythm appears.	Select Confirm
"ENCODE" display	NUMBER OF SHARES	Enter the number of shares on your seed drill.	Enter
	SHARES IN TRACK	The number of shares in each track to be locked out for the purpose of tramline marking.	Enter
	SEED RETURN	Return of seed to the seed hopper. Prerequisite for this recirculation: <ul style="list-style-type: none"> • Shut-off valves with seed return function are installed; • The diffuser tube is in the seed hopper. Deactivate the return function if: <ul style="list-style-type: none"> • Shut-off valves that operate both with and without seed return are installed in your seed drill; • The seed from blocked shares is to be distributed to adjacent shares. 	Select Activate Deactivate
	TRAVEL SENSOR	The travel sensor measures the distance travelled in the field.	Select

Displays travel sensor.	WHEEL DRILL	Travel pulses are generated by the drive wheel.	
	CM / IMP.	Enter the cm of travel per pulse under "WHEEL DRILL." CALIBRATE	Enter
	RADAR	Equipment currently not available.	
	PULSES / M	Number of pulses per meter	
	CALIBRATE	After confirming, you can use the follow-on menus to: <ul style="list-style-type: none"> • Enter CM / PULSE, or; • Have CM / PULSE calculated. The number of pulses is incremented. 	Enter
Displays travel sensor.	Flashing CALC. WHEEL	Activate at the end of the 100 m long travel path. Calculate CM / PULSE.	Activate
	NO. OF PULSES	Displays: <ul style="list-style-type: none"> • During travel: The incrementing number of pulses; • Upon stopping after 100 m: The total number of pulses measured over this distance. 	View
	DRIVE 100 M	Calibration instruction: "Drive exactly 100 m."	DRIVE
"ENCODE" display	OPERAT. SENSOR	Select the type of operation sensor.	Select
Operation sensor types	3-POINT EXTERNAL	Prerequisite: The external operation sensor must be installed. This selection is only required if: <ul style="list-style-type: none"> • The seed drill is not equipped with track markers; • No signal from the signal socket is available. 	
	3-POINT DIN / ISO	Prerequisite: The tractor is equipped with a DIN / ISO signal socket. The metering device is controlled via the DIN / ISO signal socket.	
	DRILL	Control via track marker changeover mechanism.	
	NONE	Selection only required if the track marker changeover mechanism cannot be controlled via sensors. Note: Fahrgassenschaltung Then use "Rhythm+" and "Rhythm-" to manually set the tramline.	
"ENCODE" display	WORKHOUR ON/OFF	Measures the sowing time, taking into account the operation sensor or a manual switching die. Display of the measured sowing time under: <div style="text-align: center;">  → TIMER </div>	Select Enter

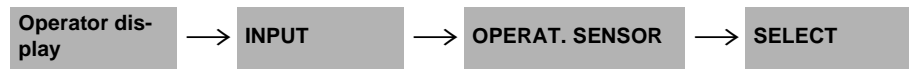
Display timer	OPERAT. SENSOR	Measures only the sowing time.	Select
	MANUAL	Measures the total time required for rotating, driving, turning, and sowing.	
"ENCODE" display	ALARM DISPLAY	In this menu, you can turn alarms on and off, as described in more detail beginning on page 71.	Turn on or off
	DATE CLOCK	Display or change the current date and time.	Display Enter

Practical Example

You want to set the operation sensor first, then the travel sensor.

Operation Sensor Setting:

The table above contains information concerning the individual sensors.



OPERAT. SENSOR	
NONE	
SENSOR NONE	
SENSOR DIN / ISO	
LIFTDRILL	
NONE	

You have selected NONE

- even though a sensor is installed on the track marker changeover mechanism. The NONE function is deactivated and the tramlining rhythm when the track marker is changed over will continue to be automatically incremented, just as if you had selected DRILL.
- even though your machinery is equipped with a wheel sensor. With this combination, the ESA automatically switches to the DRILL operation sensor. The information appears in the operation sensor display.
- because there is no sensor installed on the track marker changeover mechanism.

Please note:

The tramlines will not automatically switch. In this case, you must manually enter the change in the tramlining rhythm.

Manually Change the Tramlining Rhythm

Symbol display →



→ SCROLL

2	6	3	6
TRACK-NO		TRACK-NO	
180		180	
KG / HA		KG / HA	
XXX		XXX	
MANUAL START		MANUAL STOP	
TRACK +1		TRACK +1	
TRACK -1		TRACK -1	
SCROLL		SCROLL	

In the example, the rhythm was increased from 2 to 3. The tramline is set up at 3 (black line on the tramline diagram).

Travel Sensor Setting

Depending on how your seed drill is equipped, you can use either a sensor on the seed drill drive wheel or a wheel sensor to measure the distance travelled on the field. In order to obtain precise measurements, you must first calibrate the sensor. There are two options for doing this:

- Use the keyboard to enter the previously calculated value for CM / PULSE;
The table lists the most common values for CM / PULSE and the number of pulses generated by the sensor on the drive wheel after travelling a distance of 100 meters.
- Or make an actual test drive on the field.

NOTE The calculated values do not apply to radar sensors.

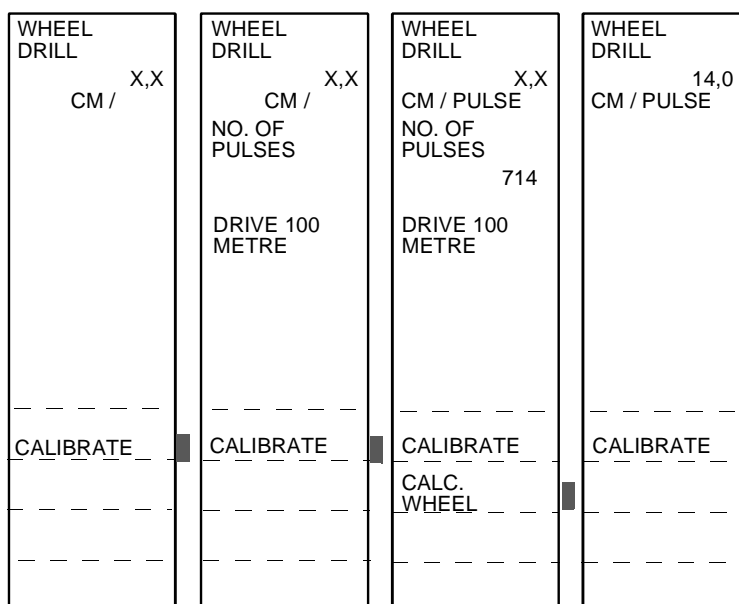
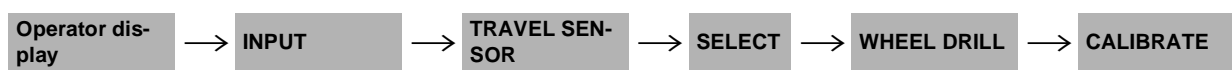
Drive wheel	Approx. value of CM / PULSE	Approx. number of pulses after a distance of 100 m.
MSC / KLX / DA / DA-S / DE-S / DF / DG / DA-X	14,0	714
7.00-12 (DL)	11,8	850
26.00-12.00 (DL)	12,0	833
7.50-16 (DT)	14,3	697
31-15.50 (DT / DV / DC)	13,7	731

NOTE However, the table data will result in imprecision on difficult terrain since the actual field conditions (e.g., slipping, rough ground) was not taken into consideration.

Determining the values by means of a test drive is more accurate as this takes the actual field conditions into account.

The example is for the calibration of sensor at the drive wheel with the aid of a test drive.

- Mark a precisely 100 m long path on the field you will be cultivating.
- Drive to the starting point.
- Call up the calibration menu.



- Start the calibration (2nd display) when you start driving.
- Stop at the end of the marked stretch.
CALC. WHEEL flashes on the display.
- Calculate CM / PULSES (3rd display).
The calculated value is displayed (4th display).

TASKS

General Information



The "TASKS" task administration function is practical for entrepreneurs who are paid on a "by job" basis. For each task saved, it provides an overview of:

- The size of the area cultivated;
- The amount of seed applied;
- The cultivation time.

and permits

- Task identification by either an ID no, or an order number;
- From 1 to 35 tasks to be saved and recalled.

With the appropriate accessory equipment, you can transfer the task data to your computer for further processing, or print them out directly to an attached printer. Information concerning accessories available for the ESA is given in Chapter »Accessory Equipment« beginning on page 153.

Symbols and Terms

This table explains the symbols and terms you will encounter in the "TASKS" menu.

Continuously recurring symbols and terms are explained beginning on page 65.



In this menu, the Return symbol performs three functions:

- Confirming inputs;
- Moves you back to the previous display;
- Moves you to an additional display after all information has been printed.

TASKS		Indication that a task is running	View
		Generally stands for tasks that can still be assigned.	
	DRILL. 1	Previously saved tasks with numbering	
	TASK 34	Tasks that can still be assigned, with numbering.	

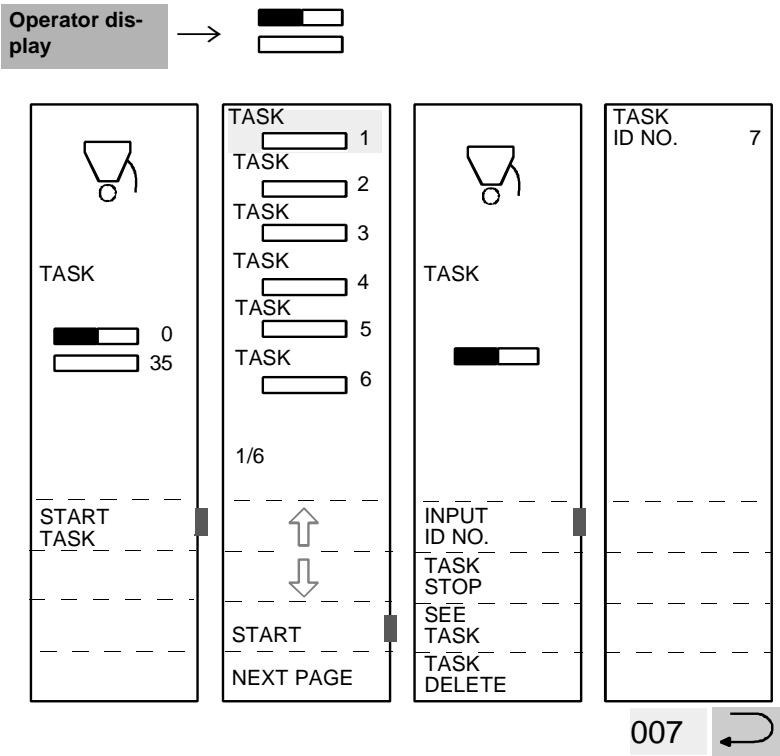
Terms on the display	KEY IN ID NO.	Opens the TASK ID NO. display	Activate
	TASK ID NO.	Enter a code number (up to 8 characters), e.g., the customer or personnel number, etc.	Enter
	TASK STOP	Interrupts a running task.	Activate
	SEE TASK	Provides two functions without starting a task: <ul style="list-style-type: none"> • First, displays the current task; • Pressing the key a second time displays the status of the current task. 	Display
	START TASK	Select a task, then start it.	
	START	<ul style="list-style-type: none"> • New task selected: "START" starts the new task. • Previous task selected: "START" continues the previous task, even if it has not been completed. • Previous task completed with "STOP . TASK": calling the previous task up again and pressing "START" cancels the "STOP . TASK" command and continues processing the previous task. 	Select Start
	TASK DELETE	Displays the task to be deleted and deletes it.	Activate
	PRINT TASK	Switches you to the print menu and offers the following selections: <ul style="list-style-type: none"> • "PRINT ONE" • "PRINT ALL" 	Activate
	PRINT ONE	The selected task is displayed. Prints the selected task. Prerequisite: A printer is connected and ready.	Activate

Terms on the display	Prints the task.	After printing (printing task) automatically returns you to the print menu.	View
	PRINT ALL	Selected tasks are not displayed. Prints all tasks. Prerequisite: A printer is connected and ready.	Activate
	Prints all tasks	Makes the tasks available to the printer (printing all tasks), then automatically returns you to the print menu.	View
		Using the Return key, you can access the delete menu with the following selections: <ul style="list-style-type: none"> • "DELETE" • "CANCEL" Note: This menu can only be accessed after all tasks have been printed.	Activate
	DELETE	This menu only allows you to delete all tasks. Individual tasks cannot be deleted here.	Activate
	CANCEL	Cancels the print order.	Activate
	NEXT PAGE	35 tasks are filed on 6 pages. Use "NEXT PAGE" to sequentially page through all task pages.	Activate

Practical Example

You want to set up two tasks with task numbers, view the tasks, then print them.

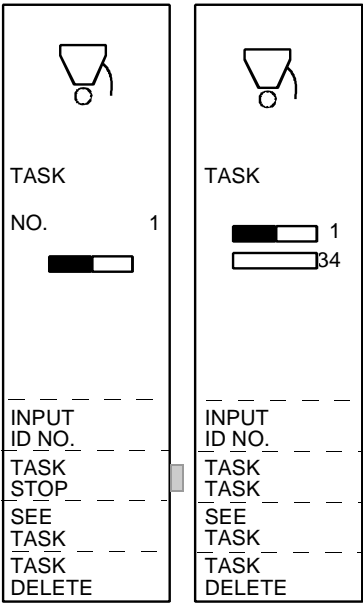
Setting Up the First Task



The first task is assigned the ID no. "007". The zeros are not shown on the display.

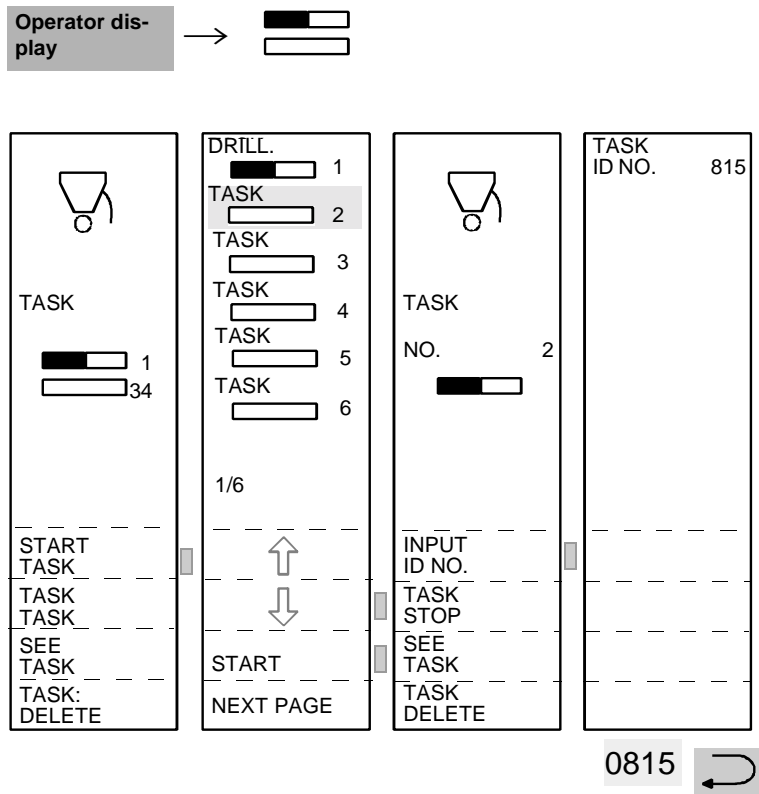
Working with the task and ending the task.

Press to return to the operator display. indicates that a task is currently. If you do not wish to set up another task, start this one and begin drilling. Once drilling has been completed, complete the first task.



If you wish to continue an existing task, the computer adds the values for kg and hectares to the existing values. With the start of a new task, the count for this task starts at "0".

Setting Up the Second Task



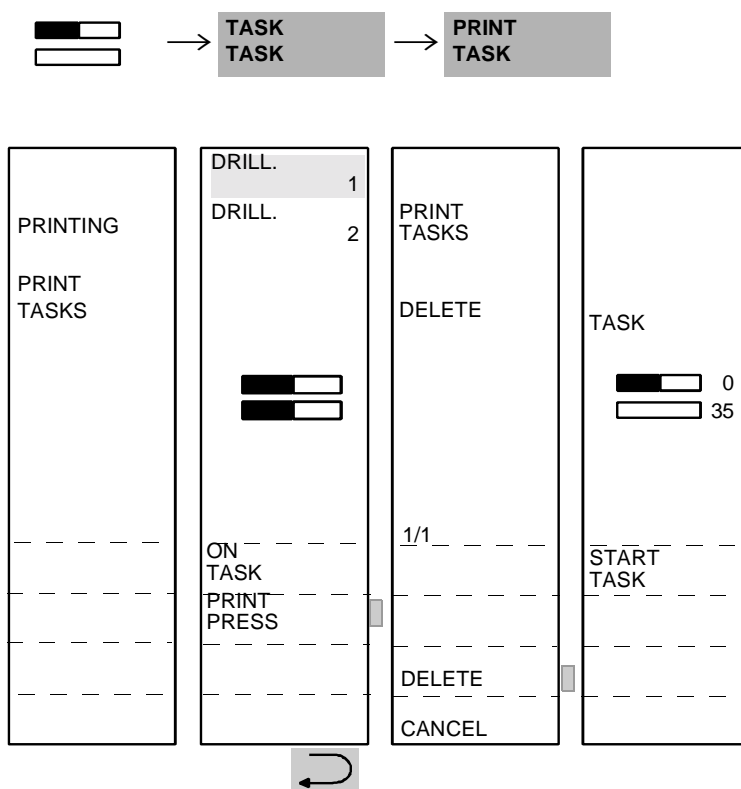
Complete the second task in the same way as the first.

Display Task

Before starting cultivation, you can call up all saved tasks and view them sequentially without starting or printing them.



Print Tasks



After preparation for printing ("printing all tasks"), the most recently processed task is marked. You can now mark each task you wish to print, or print all tasks.

Pressing the Return key once all tasks have been printed takes you to the display in which you can delete all the printed tasks.

DATA / DELETE

General Information

The "DATA / DELETE" offers you the option of deleting the all or selected data from the most recent cultivation work. The data relate to:

- Time;
- Area;
- Distance;
- The amount of seed applied;

for the most recently cultivated field.

Prerequisite: The data were reset ("zeroed") prior to the start of cultivation.

You can also view summarized data (data totals with a "+" after TIME, HA, METRES, KG) from the previous pass here, but can only delete them individually.

NOTE This is the only menu in which you can view total data.

Symbols and Terms

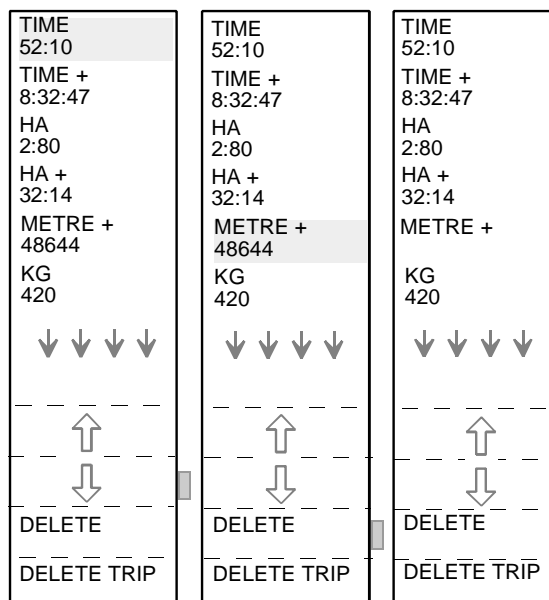
This table explains the symbols and terms you will encounter in the "DATA / DELETE" menu. The information applies to the start of the zero setting. All values identified by a "+" are values from the total counter.

Continuously recurring symbols and terms are explained beginning on page 65.

Terms on the display	TIME	Field data for the working time	Select
	TIME +	Total count of the working time	
	HA	Field data for the cultivated area	
	HA +	Total count of the cultivated area	
	METRE +	Distance travelled, in meters	
	KG	Field data for the amount of seed applied	
	KG +	Total count of the amount of seed applied	
	DELETE	Deletes the value in the display. The display is not visible while a task is running. Stop the task in order to bring up the display and to allow the task to be carried out.	Activate
	DELETE TRIP	Deletes all the values for the most recent trip. Totalled values remain intact, and can only be deleted individually. The display is not visible while a task is running. Stop the task in order to bring up the display and to allow the task to be carried out.	Activate

Practical Example

You want to delete the value for meters from the total counter



SYSTEM

General Information

You can perform the following settings in the "SYSTEM" menu:

- Select the display language;
- Activate a second metering shaft;
- Check the function of sensors and actuators;
- Switch the GPS on.

You can only switch the GPS satellite navigation system on if the associated electronic equipment (module) is installed.

NOTE Additional menu functions are for the use of service technicians.

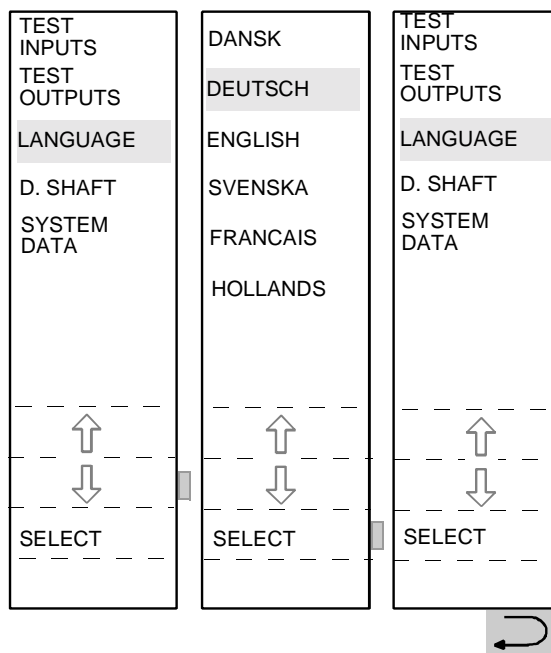
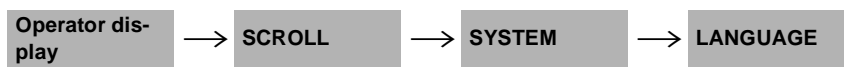
Symbols and Terms

This table explains the symbols and terms you will encounter in the "SYSTEM" menu. Continuously recurring symbols and terms are explained beginning on page 65.

	TEST INPUTS	Used to locate faults in sensors and actuators with the aid of the diagnostics display. HI and LO, together with the change of pulse states indicate whether the sensor is even receiving pulses.	Select
Input test diagnostic displays	WHEEL. IMPLEMENT	Sensor functional tests.	View
	RADAR		
	MOTOR 1 MOTOR 2		
	DRILL SHAFT 1 DRILL SHAFT 2		
	MOTOR 1	Check of drive motor 1	Activate
	MOTOR 2	Check of drive motor 2	Activate
	TRACK MARKER	Sensor functional tests.	View
	SENSOR		
	FAN		
	HOPPER SENSOR 1 HOPPER SENSOR 2		
	GRAIN WARN. 1 GRAIN WARN. 2 GRAIN WARN. 3 GRAIN WARN. 4	GRAIN WARN., currently not available.	
	TEST OUTPUTS	Used to locate faults in sensors or actuators on shut-off valves or drive motors with the aid of the diagnostics display.	Select
Output test diagnostic displays	OUT 1 OUT 2 OUT 3 OUT 4	Sensor functional tests.	View
	POT 1 POT 2	Tests the metering device drive potential when OUT 2 or OUT 4 is activated.	View
	OUT 1	Tests the shut-off valve(s) on the left.	Activate
	OUT 2	Tests motor 1. When the motor is running, the value at the OUT 2 sensor constantly changes. This checks the pulse generator. If the value does not change, the pulse generator may be defective.	
	OUT 3	Tests the shut-off valve(s) on the right.	
	OUT 4	Tests motor 2. When the motor is running, the value at the OUT 4 sensor constantly changes. This checks the pulse generator. If the value does not change, the pulse generator may be defective.	
	LANGUAGE	Select the display language.	Select
	D. SHAFT	Activate or deactivate the second metering shaft.	Turn on or off
	GPS SYSTEM	Activate or deactivate the GPS System. If the module is not installed, a module prompt will appear on the display if you attempt to activate the GPS system.	Turn on or off
	SYSTEM DATA	Only for the use of service technicians.	

Practical Example

You would like the display information to appear in your native language.



Calibration Test

General

The calibration test is essential for optimum cultivation. The prerequisites for performing a calibration test include:

- All required data must be entered.



- For seed drills with one metering device – turn the second seeding shaft off; two metering devices – turn the second seeding shaft on.



Please note the following before starting the calibration test:

- NOTE:**
- The calibration test can only be performed if the tractor and PTO shaft are switched off.
 - For seed drills with two metering shafts, the calibration test starts with the left (front) metering device.
 - To avoid inaccuracies, perform a calibration test with each metering device.
 - Perform a new calibration test every time you change seed type.
 - If the desired type of seed is not shown in the ESA seed list, select one with similar characteristics.
 - The factory-defined default value for the micrometering system is "ON". You can only change this setting if you receive the information, "MICMETER OFF" on the display.

In this case, you must turn the micrometering system off at the seed drill as explained in the Chapter, »Preparation Work - Drilling« beginning on page 121. However, the micrometering system on some seed drills is extremely difficult to access. In this case, bypass the deactivation:

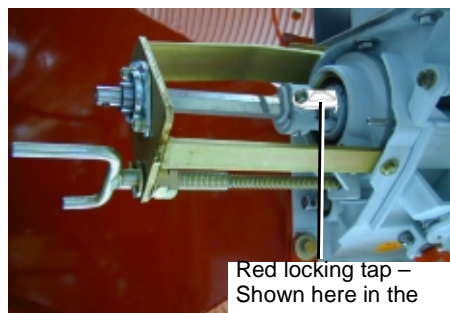
- Leave the micrometering system turned on.
- Enter a larger setpoint value than indicated at the metering device.
- Perform one or more calibration tests for comparison purposes.

Only if the sowing quantity for fine seed drops below the desired value by more than 15% with the metering device fully opened will you need to turn off the micrometering on the seed drill as described in the Chapter, »Preparation Work - Drilling«, Section. »Micrometering off«, page, 121.

Performing a Calibration Test



- For the calibration test, the machinery must be in the transport position, with wheels chocked to prevent rolling, and sides secured against extension.
- Inspect the seed hopper for foreign objects.

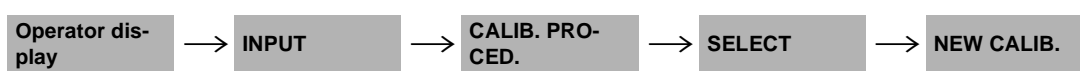


If your unit is equipped with two metering devices, perform the calibration tests sequentially for both metering devices.

Before you can begin the calibration test:

- Close the hopper emptying flaps on the metering device.
 - Place the red locking tap in the "Fine" or "Normal" seed position.
-
- Add sufficient seed to the hopper for the calibration test.
Please note: The hopper low level sensor in the seed hopper must be covered by at least 3 cm of seed.
 - Place catch pans under the metering devices.
The catch pans must be large enough to hold the seed generated during the calibration.
 - Open the hopper emptying flaps.

Now make the necessary settings via the ESA.



In the subsequent displays, either accept the indicated default values with "OK", or enter:

- The amount of seed, in kg / hectare
- The working speed, in km / hr.
For example, based on your experience, the speed ranges between 10 and 15 km / hr.

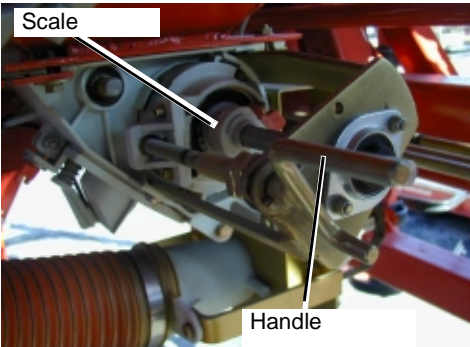
➤ Enter, for example, 12.

Then

➤ Select the seed from the display.

Once you have selected the seed type, the display showing the current settings for the metering device appears.

WHEAT
NORMAL SEED
SET VALUE MM 53
MICROMETER ON
OK



- The calculated setpoint value is, for example, 53 mm.
- Using the calibrating handle, set this value at both metering devices. Only modify the micrometering system settings if explicitly asked to do so by the ESA.

The seed drill is now ready for the calibration test, starting with the front (left-hand) metering device.

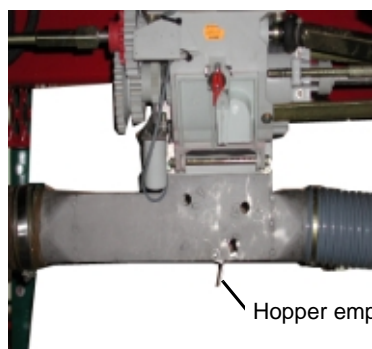
- Start the calibration test with 1 / 10 or 1 / 20 hectare.

WHEAT			WEIGHT 0
NORMAL SEED	DRILL READY		GRAMME
SET VALUE MM 53	LEFT SIDE		
MICROMETER ON			
OK	FILL CELL	START 1 / 10 HA	START 1 / 10 HA
		START 1 / 20 HA	START 1 / 20 HA

NOTE For sowing volumes up to approx. 100 kg / hectare, we recommend performing the calibration test at 1 / 10 hectare. For higher sowing volumes, use 1 / 20 hectare.

After starting the cell wheel turns at the previously set speed. "WAIT" flashes on the display.

Pause



Hopper emptying flap

- Interrupt the test with "PAUSE", e.g., to change catch pans.
- Deactivate "PAUSE" with "RESTART".

At the conclusion of the calibration:

- Close the hopper emptying flaps.
- Weigh the seed.

NOTE The amount of seed generated during the calibration does not correspond mathematically to the quantity to be expected for 1 / 10 or 1 / 20 hectares. For the calibration test, the ESA specifies a specific number of rotations for the metering device, regardless of the area. Only after the test of the calibration test results will the metering device distribute the amount of seed corresponding to the area.

- Enter the weight of the weighed seed, in grams.
- Select "CALC.".
 - The sowing speed range for the calibration test is displayed.
- Confirm with OK.
 - Permits cultivation to be carried out with the determined values without saving them.

NOTE We strongly recommend performing a test of the values determined by the calibration test. →, page 102.

Save Calibration Test

You can also save all input and calculated values for the current calibration test. Up to three calibration tests can be saved.

- Save the calibration test.

Variations

1. You want to work with the values of a previously saved calibration test:
 - Call up the calibration test
 - Set the values at the seed drill.
2. You want to work with the values of a previous calibration test, but want to change the sowing quantity:
 - Simply enter the new quantity, do not recalibrate.
 - Set the values at the seed drill.

Performing a Test of the Calibration Test Results

- With this test you can check whether the amount of seed in the catch pans corresponds to the desired amount of seed.
- Lower the track marker arm.



- Place catch pans under the metering devices and open the hopper emptying flaps.
- Enter an area for the test, e.g., 0.10 hectares

NOTE The larger the area you select, the more accurate the test will be.

TEST
CALIB.
TEST.
AREA

0.10
HA

— — — — —
START

— — — — —

— — — — —

— — — — —

After the Test:

- Combine the seed from all catch pans and weigh it.
- Calculate the amount of seed / hectare.
- In case of large deviations, repeat the test.

If there are significant differences between the test results and the desired amount of seed, decide whether the test or the calibration test itself should be repeated, based on the settings and the results.

Call up the calibration test

When the calibration test is next called up, you will first be shown the saved tests. After selecting one, use the metering device settings or repeat the calibration test.

TramliningRhythm

The tramlining rhythm defines when tramlines are to be set up on the field. The number of blocked shares is determined by the track and tyre width of the tractor you are using for fertilising and spray work. At the factory, all settings are set to the information you provided at the time you ordered the machinery.

NOTE If the working width of the spraying/fertilising equipment or the tractor's track width changes, please contact your dealer die.

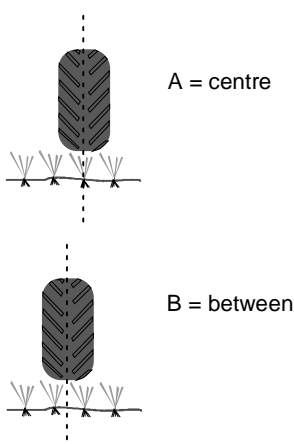
Principals

Before you can set up tramlines, it may be necessary to make alterations to the seed drill. This is always the case if you want to operate the machinery with a sprayer whose width differs from that of the one you normally use. The installation or modification of shut-off valves is generally required. If these modifications are required, have them performed before setting up the tramlines.

Setting Up Tramlines

Tramlines are set up by blocking shares, and this process is dependent on the track width of the tractor, the width of the sprayer/fertiliser, and the width of the rows. The tractor track width can be dimensioned so that the tractor tyres:

- Drive over the centre of a seed row, or;
- Drive between two seed rows.



Use the graphic in conjunction with the table. The following apply:

- A = Drive over the centre of a seed row.
Please note: Select the number of blocked shares so that the tractor tyres do not drive over any seed row.
- B = Drive between two seed rows,
Please note: Select the number of blocked shares so that the tractor tyres do not drive over any seed row.

NOTE For particularly wide tyres, you will need to block several adjacent shares to set up the tramline.

The table provides information regarding the track width of the sprayer/fertiliser tractor as dependent on the row width.

Row width [cm]	Seed drill width [m] with (no. of shares)	Spraying/fertilising tractor track width [m]						
		A	B	A	B	A	B	A
9,4	6 (64)	1,41	1,50	1,59	1,69	1,78	1,88	1,97
10,3	6 (58)	1,34	1,43	1,55	1,65	1,75	1,86	1,96
12,5	6 (48)	1,38	1,50	1,63	1,75	1,80	2,0	–
15,0	6 (40)	1,35	1,50	1,65	1,80	1,95	2,10	–

Calculate the Rhythm

overview

The table is merely intended as an overview. It lists possible tramlining rhythms for a seed drill (working width: 6m) as dependent on the working width of the sprayer/fertiliser equipment (m), e.g., field sprayer, manure spreader.

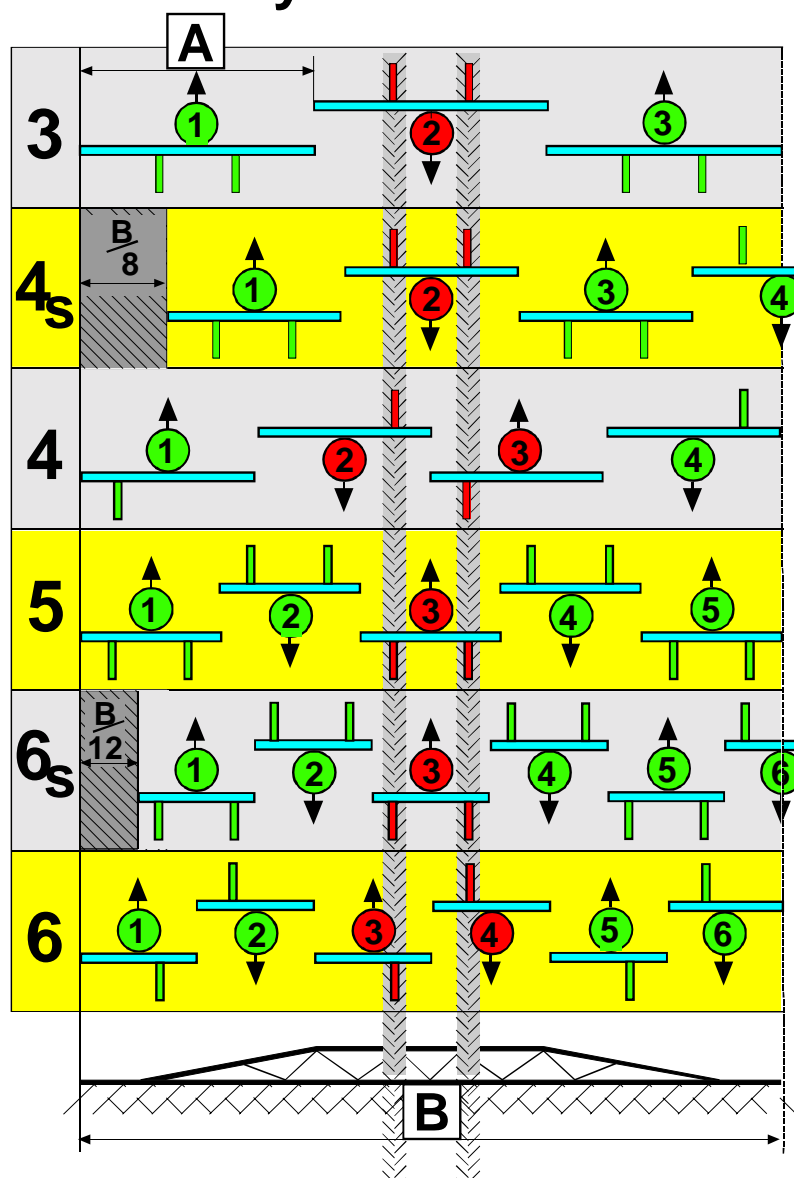
	Spraying/fertilising equipment working width			
	18	24	30	36
Tramlining rhythm	3	4	5	6

The following graphic provides a schematic illustration of possible tramlining rhythms.

Rhythmus B/A

- A = Sowing
 B = Fertilising / spraying
 B/8 = of the working width of the sprayer, 1/8 or 1/2 the working width of the seed drill
 B/12 = of the working width of the sprayer, 1/8 or 1/2 the working width of the seed drill

Numbers on the left = tramlining rhythm



Calculate with the ESA

The rhythm for your equipment can be calculated with the aid of the ESA.

Enter the working width

INPUT → **WORKING WIDTH**

- Enter the width of the spraying/fertilising equipment. If you do not wish to set up any tramlines, enter "0".

INPUT → **RHYTHM** → **CULTIVAT IM- PLEM.**

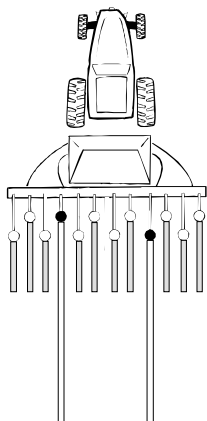
The calculated rhythm is shown on the display.

Because the rhythm depends on the working width of both the seed drill and the sprayer/fertiliser, it can be:

- even, or;
- symmetrical, or;
(with an "S" after the number, indicating symmetry),
- uneven, or;
- a special rhythm.

The type of rhythm affects the set up of tramlines.

Uneven Rhythms

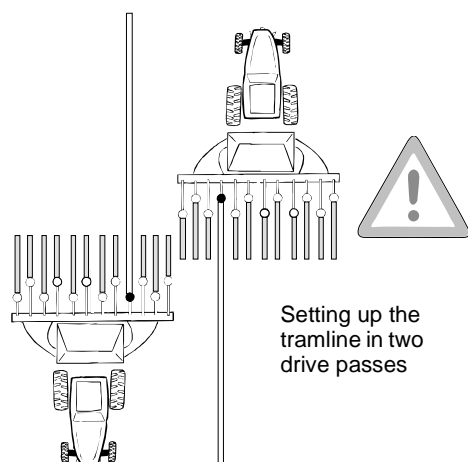


Setting up the tramlines during a single drive

3, 5, 7, 9, 11

During a single drive, the tramline is always set up symmetrically. You can begin cultivation on the right or left side of the field.

Even Rhythms



2, 4, 6, 8, 10, 12

The tramline is set up during two drive passes.

The side of the field on which you must begin working depends on which side of your seed drill (left or right) the shut-off valves are installed.

If you start on the wrong side of the field, the spraying/fertilising equipment will not fit in the tramlines.

VALVE LEFT	RIGHT START	WORKING WIDTH
VALVE RIGHT		600 cm
SYMMETRI-		CULTIVAT IMPLEM. WIDTH
		2400 cm
		RHYTHM
		4
↑ ↓	OK	OK
SELECT		

- In the menu, choose between shut-off valves on the left or right.
The side of the field on which you can start working is displayed.
- Confirm the result
The tramlining rhythm is displayed.

NOTE Setting up the tramlines in two drive passes means that the individual tracks cannot be set up as precisely as with a single drive pass. However, with even rhythms, the tramlines can be set up in a single drive pass. Your machinery must be set up for this at the factory. → Section »Symmetrical Rhythms«, page 108.

Symmetrical Rhythms

Z. B. 2S, 4S, 6S

Symmetrical rhythms compensate for the disadvantage of even rhythms, i.e., having to make two drive passes. Symmetrical rhythms are additionally identified by an "S". During the first drive at the start of the field you must turn off half the working width. The machinery must be set up at the factory for symmetrical rhythms.

Turn off half the working width



- Turn off half the working width and begin drilling on the corresponding side of the field. This pass is not counted in the tramline sequence.
- On the return pass, drill with the full working width. This is pass "1" in the tramline sequence. Do not drive in the track marker track, but along the boundary of the surface cultivated in the first pass.



If you fail to turn half the working width off during the initial pass or you do not drive along the boundary of the cultivated area on the return pass, the spraying/fertilising equipment will not fit in the tramlines.

Special Rhythms

Special rhythms result from a poor ratio of seed drill working width and sprayer/fertiliser equipment working width. The machinery must be set up at the factory for special rhythms.

The side of the field on which you must begin working depends on working width of both the seed drill and the sprayer/fertiliser.



If you start the first pass on the wrong side of the field, the spraying/fertilising equipment will not fit in the tramlines.

Operation

Drilling on conjunction with the ESA is described in the Chapter, »Operation«, Section, »Drilling«.

Preparation Work - Drilling

Depending on your machinery's configuration, prepare the following for drilling:

- Sowing coulter
- Press wheels
- S covering tines
- Track marker
- Pre-emergence marker
- Shut-off valves
- Reduction head
- Metering device and calibration test

The following are prerequisites for performing the preparation work:

- The machinery is coupled to the tractor;
- The hydraulic system must be connected and operational;
- The machinery must be secured and in its operating position.



The following applies to all preparations for use:

- Without fail, observe the safety instructions when performing all operations.
- Secure the machinery against accidental starting and rolling.
- The machinery must be level and stand securely and, if necessary, be supported during the work.
- The machinery's frame must be parallel to the ground.

The following applies when performing all operations:

- Secure the machinery.
- Lower the machinery to its operating position.
- make adjustments as desired
- Return the machinery to the transport position.

Preparation Work - Drilling

Adjusting the seed coulters pressure

Adjust the sowing depth at all seed coulters

- centrally via the central seed coulters adjustment for all seed coulters:
either mechanically or hydraulically
- at the individual seed coulters;
via spring pressure for CX or normal seed coulters;
via the gauge wheel for CX-plus seed coulters.

The higher the seed coulters pressure the deeper the seeds will be deposited. The final adjustment of the seed coulters pressure can only be performed in the field because the sowing depth depends on the soil conditions.

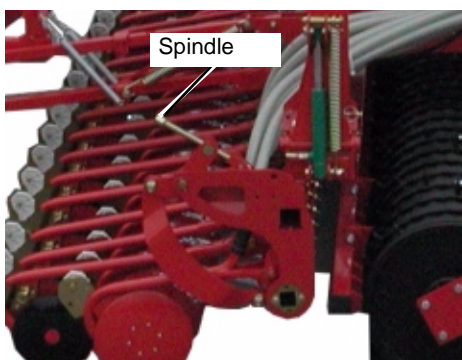
Central Seed Coulters Pressure Adjustment

The central seed coulters pressure adjustment changes the pressure on all seed coulters at once. The central coulters pressure adjustment can be performed

- mechanically, or
- hydraulically

Mechanical Adjustment for Normal and CX Seed Coulters

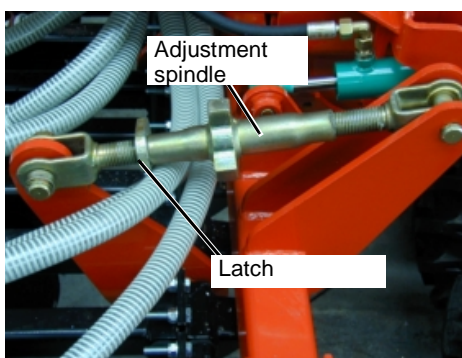
The coulters pressure adjustment spindles centrally change the coulters pressure for all coulters on the rail.



- Increase or decrease the coulters pressure at the spindles.

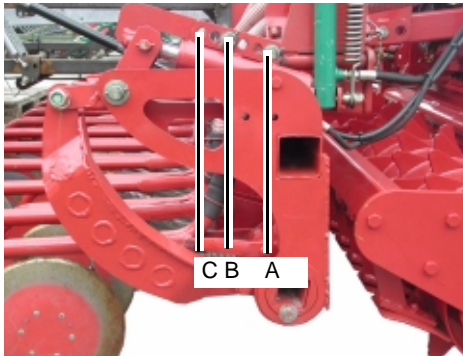
Mechanical Adjustment for CX-plus Seed Coulters

The coulters pressure adjustment spindles centrally change the coulters pressure for all coulters on the rail.



- Release the latch.
- Increase or decrease the coulters pressure at the spindles:
 - Increased coulters pressure = Extend the spindle
 - Decreased coulters pressure = Retract the spindle
- Secure the spindle.

Hydraulic Seed Coulter Pressure Adjustment



The hydraulic coulter pressure adjustment allows you to change the coulter pressure while drilling. The maximum coulter pressure and the range in which the hydraulic adjustment is effective are set by means of bolts.

Information regarding coulter pressure can be found in the coulter pressure diagram in the Section, »Coulter Pressure Adjustment for Individual Coulters«, page 112.

- Remove both bolts.
- Fully extend the hydraulic cylinder for the coulter pressure adjustment.
- Insert the first bolt in the hole closest to the desired minimum coulter pressure. Coulter pressure increases hole by hole from right to left.
- Advance the hydraulic cylinder until it is stopped by the just inserted bolt.
- Now insert the second bolt in the hole closest to the desired maximum coulter pressure.

When activated, the hydraulic cylinder will now change the coulter pressure so that it is within the desired range.

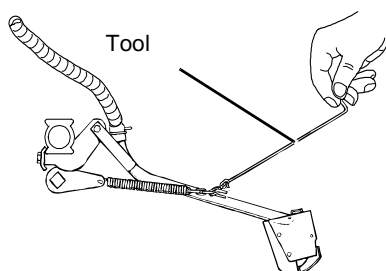
Coulter Pressure Adjustment for Individual Coulters CX and Normal Seed Coulters

The coulter pressure should be lower on the front coulter than on the rear coulter for:

- Loose soil;
- Narrow seed rows, or;
- Higher speeds;
because the rear coulter also covers the seed rows produced by the front coulter with soil.

Tip It may be practical to increase the pressure on the coulters that follow the tractor tracks.

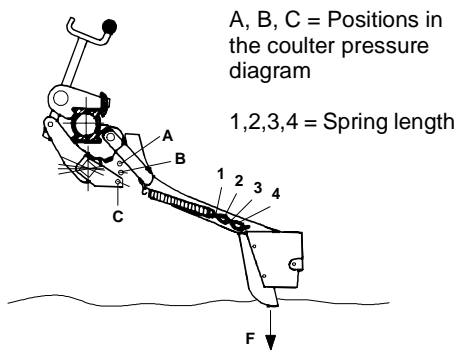
Adjust the coulter pressure for individual coulters by relocating the coulter pressure spring. Use the tool provided.



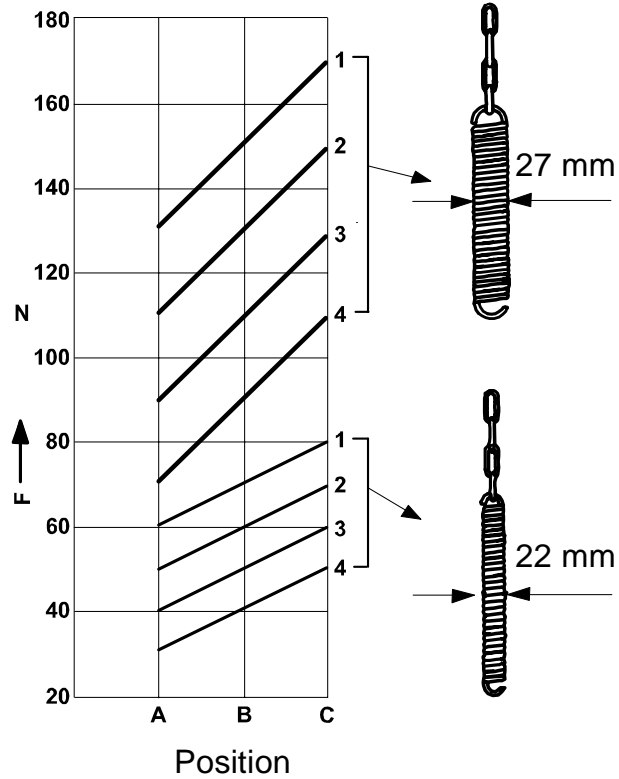
- Using the tool, unhook the tension chain.
- Hook it in place in the desired position.

Preparation Work - Drilling

Coulter Pressure Diagram



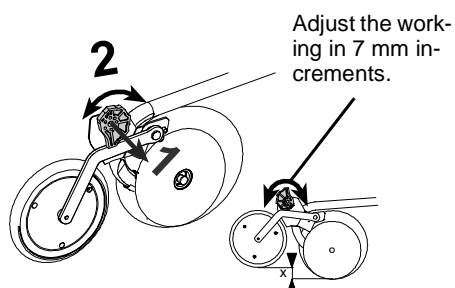
The coulter pressure diagram indicates the coulter pressure. Coulter pressure depends on the strength of the spring, the spring length, and its position.



Gauge Wheel Adjustment

The adjustments for the CX and CX-plus coulters differ.

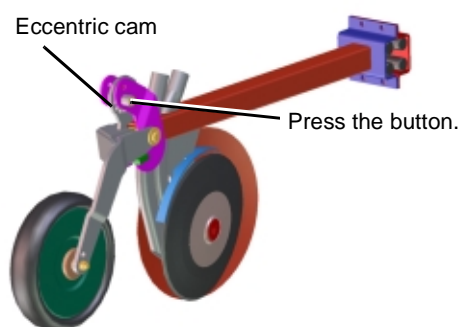
CX Seed Coulter



Rotating the eccentric cam changes the seed coulter working depth in 7 mm increments.

- Pull the eccentric cam out slightly (1), then;
- Turn it to adjust as desired (2).
- Make sure the eccentric cam re-engages.

CX-plus seed coulter



Rotating the eccentric cam changes the seed coulter working depth in 7 mm increments.

- Press the eccentric cam out at the button and
- rotate as desired.
- Make sure the eccentric cam re-engages.

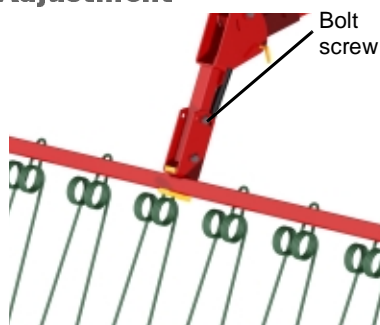
Preparation Work - Drilling

S Covering Tines Adjustment

Various adjustments of the S covering tines are possible.

- Rake angle;
- Bearing pressure.
- Length

Rake Angle Adjustment



Depending on the amount and type of harvest residue, you can adjust the rake angle by a total of 45° (3 x 15°).

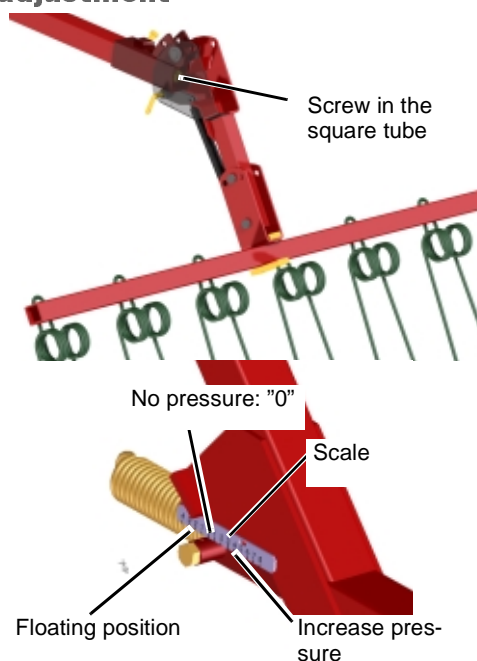
The following rule of thumb applies

- Light soils and soils with no harvest residue = steeper rake angle
- Heavy soils and soils with harvest residue = shallower rake angle

Perform the adjustment uniformly for all brackets:

- Release and remove screws.
- Adjust the rake angle as desired, reinsert and retighten the screw.

Bearing pressure adjustment



Using pressure, adjust the depth of the S covering tines based on the soil conditions.

The following rule of thumb applies:

- Heavy soil = Increase pressure.
- Light soil = Decrease pressure.
- Risk of clogging = Floating position

- Using the special spanner, turn the screw in the square tube in the desired direction. Check the value on the scale.

Adjust a uniform application pressure for all S covering tines.

Track Marker Adjustment

During the forward pass, the track markers mark a path in the seed bed for the return pass. For this purpose, adjust the track markers to the:

- Front tractor wheels.
The centre of the front tractor wheel drives over the marked path
- Centre of the tractor
The centre of the tractor passes over the marked path.

To the Front Tractor Wheels

You will need the following information:

- Row width of the seed drill (= distance from share to share);
- Seed drill working width;
- Tractor track width (= Distance from the middle of one front tyre to the middle of the other).

➤ Put the machinery into its operating position.

➤ Lower the track markers.

Calculation

Length of the track markers for the front tractor wheels

$$\frac{\text{row width} + \text{working width} - \text{tractor track width}}{2}$$

Example



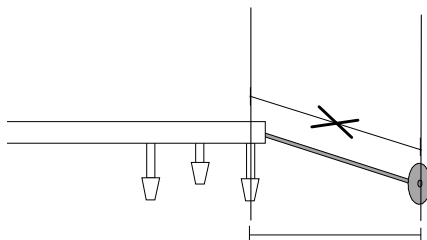
Seed drill row width	12.5 cm
Seed drill working width	400.0 cm
Tractor track width	190.0 cm

$$\frac{12,5 + 400 - 190}{2} = 111,25$$

In this example, the calculated length of the track markers is 111.25 cm.

Preparation Work - Drilling

Adjusting the Track Markers to the Front Tractor Wheels



Measure out the calculated track marker length on the ground, never directly on the track marker arm. The latter measurement is imprecise.

- Right track marker arm:
Begin the measurement in the centre of the right, outside share.
- Left track marker arm:
Begin the measurement in the centre of the left, outside share.

To the Centre of the Tractor

You will need the following information:

- Row width of the seed drill (= distance from share to share);
- Seed drill working width;

- Put the machinery into its operating position.
- Lower the track markers.

Calculation

Length of the track markers for the centre of the tractor

$$\frac{\text{row width} + \text{working width}}{2}$$

Example

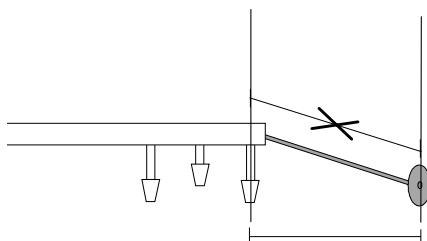


Seed drill row width 12.5 cm
Seed drill working width 450.0 cm

$$\frac{12,5 + 450,0}{2} = 231,25$$

In this example, the calculated length of the track markers is 231.25 cm.

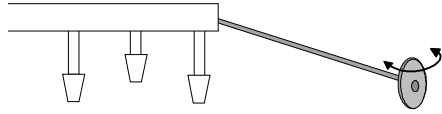
Adjusting the Track Markers to the Centre of the Tractor



Measure out the calculated track marker length on the ground, never directly on the track marker arm. The latter measurement is imprecise.

- Right track marker arm:
Begin the measurement in the centre of the right, outside share.
- Left track marker arm:
Begin the measurement in the centre of the left, outside share.

Inclination Angle Adjustment



The adjustment of the track marker inclination angle is based on the soil conditions.

- Heavy soil = Disc angled, adjust the inclination angle as you see fit.
- Light soil = Disc vertical, adjust for no, or only a small, inclination angle

With regard to the inclination angle, adjust the track markers so that the tracks will subsequently be easily visible. The track markers must not "dig in".

Pre-emergence Marker Adjustment

Pre-emergence markers mark the tramlines for spraying/fertilising work and are controlled by the ESA, ESC, or FGS.

The pre-emergence marker is equipped with two discs to mark tramlines for uneven and S rhythms. The pre-emergence marker marks both tramlines during a drive pass.

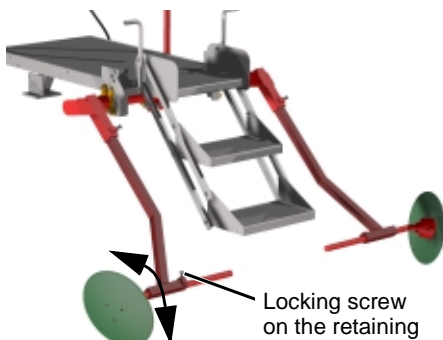
Fine Adjustment



- Loosen the locking screw.
- Pull the retaining arm out until the pre-emergence marker passes behind the blocked shares.
- Retighten the locking screw.
- Adjust the second retaining arm correspondingly.

The pre-emergence marker will lower when the share to set up the tramline is blocked.

Rake angle adjustment



Use the screw on the retaining arm to adjust the rake angle of the discs. The rake angle determines the depth of the tramline in the soil.

- Loosen the locking screw.
- Adjust the desired rake angle and retighten the locking screw.
- Adjust the second retaining arm correspondingly.

Make sure this does not alter the fine adjustment.

Preparation Work - Drilling

Shut-off valve Inspection

Shut-off valves regulate the setting up of tramlines.. They block the flow of seed to the shares. The number of shut-off valves depends on the tyre width. The location of the shut-off valves depends on the track width of the spraying/fertilising tractor.

If the track or tyre width of the spraying/fertilising tractor changes, please contact your dealer. You may need to have additional shut-off valves installed or have a different share blocked.

Reduction head Inspection

You will need a different reduction head for sowing large row widths. Before exchange reduction heads, please read the Chapter, »maintenance«, Section, »Replace the reduction head«.

Metering Device Ad- justment

The following adjustments can be made for metering device:

- The setpoint value (from the ESA or the table);
- The micrometering system (on or off);
- The locking tap (to normal or fine seed).

Preparation Work - Drilling

Determine the adjustment value

To determine the correct setpoint value, first specify whether the seeds are normal or fine.

- Normal seed grain size: between 4 and 10 mm.
- Fine seed: between 1.5 and 4 mm.

NOTE If you intend to dress the seeds yourself, observe the dressing manufacturer's safety information.

Normal seeds				Fine seeds	
Wheat	Barley	Corn	Peas	Grass	Clover
Rye	Oats	Beans	Lupines	Rape	
Kale	Rice	Soybeans		Turnips	

The table contains orientation values for a variety of normal and fine seeds, and for various amounts of seed per hectare. These values are for orientation purposes only, since seed varies with regard to grain size and relative density. Determine the precise values for your seed by performing a calibration test as described in Chapter »ESA«, »ESC«, or in the "Calibration Test" section.

Normal Seed Table

	Wheat	Rye	Barley	Oats	Beans	Peas	Lupines	Vetches	Corn	Grass
Relative density, kg / l	0,77	0,74	0,68	0,5	0,85	0,81	0,76	0,83	0,79	0,36
Setpoint value	Normal seed, kg / ha (Locking tap points to the metering device)									
10 *	34	33	32	24	23	21	28	32	8	-
15 *	51	49	48	35	42	40	45	51	24	18
20 *	69	66	64	47	61	59	62	70	47	26
25 *	86	83	79	59	79	78	79	89	70	34
30	104	100	95	71	98	97	96	108	92	42
35	122	117	111	82	116	117	113	127	115	50
40	140	134	127	94	135	136	130	146	137	-
45	157	151	143	106	154	155	147	165	156	-
50	174	168	159	118	172	174	164	184	175	-
55	192	184	174	130	191	194	181	203	194	-
60	210	200	190	141	209	213	198	222	212	-
65	228	217	206	153	228	232	216	241	231	-
70	246	235	222	165	246	251	234	260	249	-
75	264	252	238	177	265	270	251	279	267	-
80	281	269	253	189	283	289	268	298	285	-
85	298	286	268	200	302	309	285	317	304	-
90	316	302	284	212	320	328	302	336	323	-
95	335	319	300	224	338	347	320	355	342	-
100	352	337	316	236	356	366	337	374	361	-
105	370	354	332	248	374	385	354	393	380	-
110	387	371	348	260	393	404	371	412	398	-

Preparation Work - Drilling

Fine Seed Table

	Rape		Red clover		Grass		Turn-Beets	
Relative density, kg / l	0,65		0,77		0,39		0,7	
Setpoint value	Fine seed, kg/ha (Locking tap in the hexagonal shaft groove)							
2,5	2,2	1,1	2,3	1,15	-	-	2,5	1,25
5	4,6	2,3	5,3	2,65	-	-	5	2,5
7,5	6,8	3,4	8,6	4,3	2,8	1,4	7,5	3,75
10	9,1	4,55	12	6	5,2	2,6	10	5
12,5	11,4	5,7	15,3	7,65	7,2	3,6	12,5	6,25
15	13,7	6,85	18	9	9,2	4,6	15	7,5
17,5	15,9	7,95	21,3	10,65	11,2	5,6	17,5	8,75
20	18,2	9,1	24	12	13,2	6,6	20	10
22,5	20,5	10,25	26,6	13,3	15	7,5	21,5	10,75
25	22,8	11,4	27,5	13,75	16,2	8,1	23	11,5
	N	M	N	M	N	M	N	M
N = Normal seed, M = Micrometering								

NOTE For low application rates (e.g., cell width ≤ 25 mm) turning on the micrometering system may produce a more uniform seeding result even in the normal seed range.

Dressed Seeds



- Dress seeds only in accordance with the manufacturer's instructions and observe all relevant safety precautions when dressing and handling dressed seeds.
- Never
 - Dress seed in the machine;
 - Dress seed by hand;
 - Dress seed while filling the seed hopper.
 All of these procedures represent serious health hazards.

For fine seeds, please note: Glutinous dressing can influence the metering accuracy.

Filling Seed



The maximum fill height depends on the seed. The maximum fill height must always be observed.

Seed filling takes place in the field.

For the subsequent calibration test, it is sufficient to add enough seed by hand to cover the hopper low level sensor to a depth of at least 3 cm.

Micrometering System Adjustment

The micrometering system permits fine seeds to be applied at the lowest possible amounts per hectare. The factory-defined default value for the micrometering system is "ON".

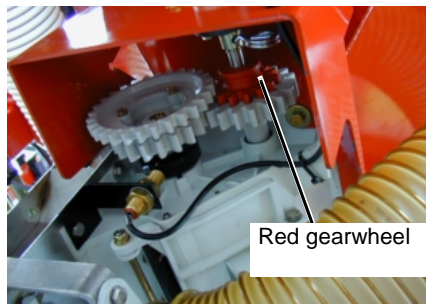
ESA

You can only change this setting if you receive the information, "MIC-METER OFF" on the ESA display.

NOTE When inserted/pulled out, the gearwheels must align so that the red gearwheel can be easily pushed in or pulled out.

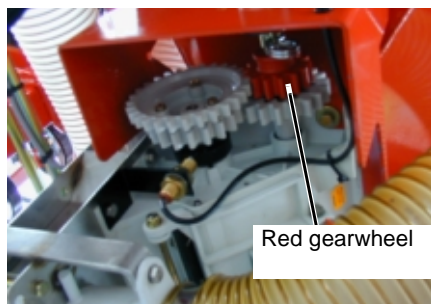
Micrometering off

- Push the red gearwheel into the grey gearwheel until they mesh.



Micrometering System Activation

- Pull the red gearwheel out until it meshes with the front gear-wheel on the left.



Preparation Work - Drilling

Metering Device Adjustment

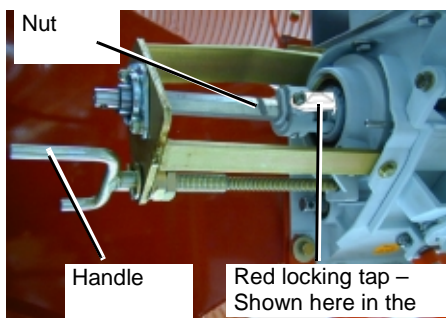
Once the micrometering system has been switched on, set the cell width for the metering device. The metering device is equipped with a metering scale labelled "Normal Seed" and "Fine Seed".

ESC

To perform this setting, you will need the correct seed value from the tables on page 119 or 120.

ESA

To perform this setting, you will need the correct seed value from the ESA or the tables on page 119 or 120.

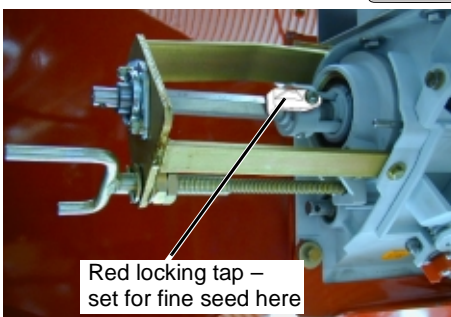


The maximum cell size for normal seed is 90-95 mm.

- Using the crank, set the seed value for the desired seed type. Turn until the desired seed value appears at the edge of the housing , or
- perform a calibration test and set the value calculated by the ESA.

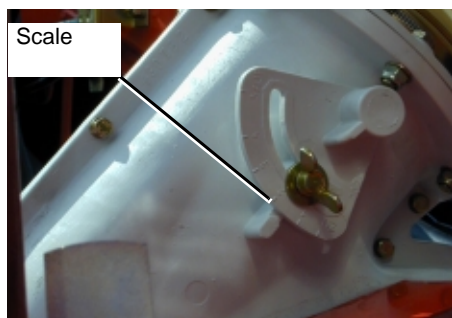
The locking tap for the adjustment for either normal or fine seed is located on the hexagonal tube on the metering device.

Only switch from normal to fine seed when the hopper is empty. Changing the setting when the seed hopper is full can destroy the metering device.



- Now set the locking tap on the metering device.:
- Normal seed = Locking tap points towards the metering device;
- Fine seed = Locking tap must engage in the hexagonal shaft groove on the metering device.

Regulating Flap Adjustment



The regulating flap on the fan regulates the airflow for the seed. The default setting is "OPEN". When using fine seed such as rape or grass, check the field to determine whether seed is being blown out of the furrow. If it is, incrementally close the regulating flap.

Adjust the regulating flap on the fan with the aid of the scale.

- CLOSED = 1
- OPEN = 5

Calibration Test Performance

A calibration test is performed with the aid of the ESA as described in the Chapter, »ESA«, Section »Performing a Calibration Test«, or with the aid of the ESC as described in the Chapter, »ESC«, Section »Performing a Calibration Test« .

Driving on the Road

Safety



Before transporting the machinery on public roads, read the following safety information. Compliance is mandatory and will help you in avoiding accidents.

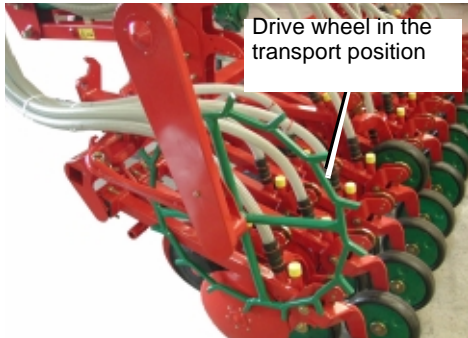
General

- Observe legal transport widths and, if necessary, install lighting, warning, and protective equipment.
- Travel on public roads is only permitted with the machinery in its transport position. Under no circumstances may a width of 3.00 m be exceeded. Any protruding or overhanging implements must be retracted prior to driving on public roads.
- The tractor's steering ability must in no way be compromised. Even with the machinery in its retracted state, there must be sufficient weight on the steering shaft.
- The seed hopper must be empty for transport on public roads. Cover the hopper with a tarp.

Before Travel on Public Roads

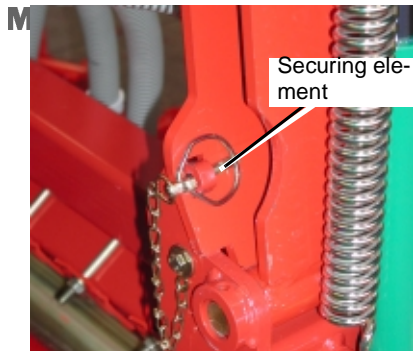
- Remove crop residue, stones and large clumps of earth.
- Mount the rear lighting panel for on-road driving.
- Check all locks for a secure seat.
- Trip ropes for quick-release couplings must hang loose and must not, when in their lowered position, release the couplings of their own accord.
- With the machinery in its retracted position, all brake, reversing, and turn indicator lights as well as the license plate must be clearly visible. If an unimpeded line of sight is not possible, the lighting and the license plate must be mounted on the seed drill.
- Secure the lighting cables in such a way that they are not subject to tension when the vehicle goes around corners and they do not come into contact with the tractor tyres.
- All other swivelling portions of the machinery such as track markers, implements, drive wheel, S covering tines, etc., must be retracted and securely locked down.

Retracting the Drive Wheel

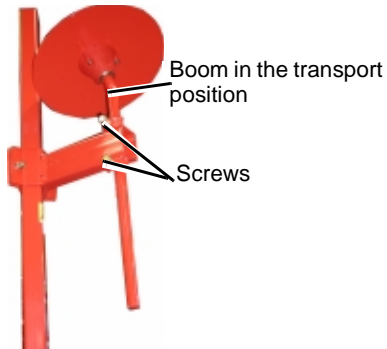


- Fold the drive wheel up, push it in, and secure it with the safety splint.

Securing the Track



- Fold the track marker up and secure it with the securing element.

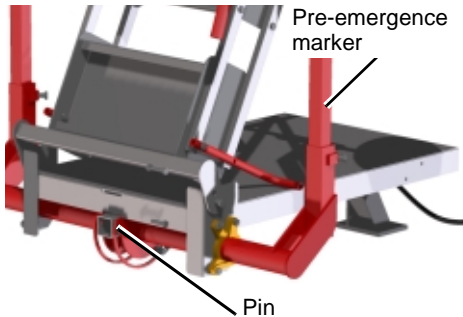


- Loosen the screws on both track marker booms.
- Remove the boom, rotate it 180 °, and reinsert it.
- Secure the boom with the screws.

Driving on the Road

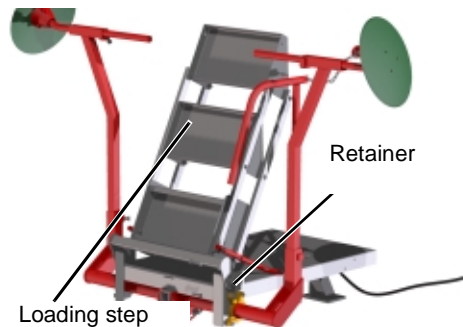
Pre-emergence markers in the transport position

The pre-emergence marker must be folded up and secured during transport.



- Lift the pre-emergence marker.
- Secure with bolt. Secure the bolt with securing elements.

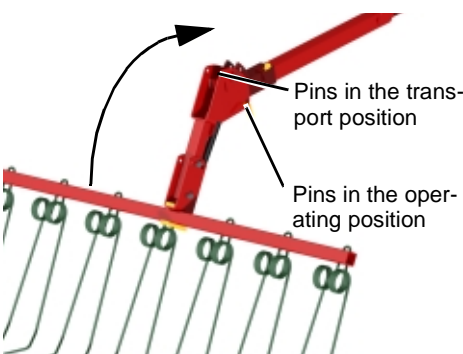
Loading step in the transport position



- Fold up the loading step and secure it to the side.

S covering tines in the transport position

If machines are transported on, for example, a low bed trailer, the S covering tines must be folded up for transport.



- Remove bolt.
- Fold the S covering tines up.
- Secure the S covering tines with the bolt and secure the bolt with a cotter pin.

On-road driving

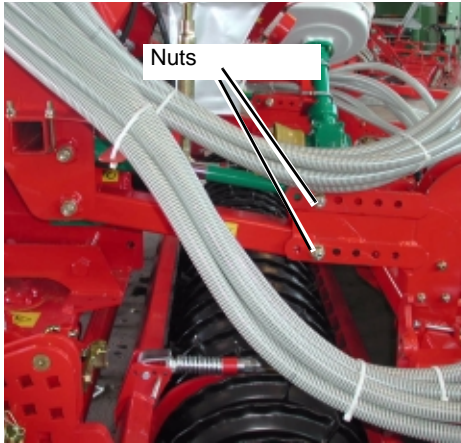


- Before starting, check the immediate surrounding area. Always ensure an unimpeded view and take particular care to watch for children in the vicinity of the machinery.
- Check that:
 - All implements are retracted;
 - All safety equipment has been installed;
 - The loading step is folded up;
 - The lighting equipment is installed;
 - The hopper emptying flaps are closed.
- When driving, lock the control units on tractor.
- Close the shut-off valves on the hydraulic connections.
- Do not transport people or objects on the machine.
- Do not exceed 25 km / h during transport.
- Always adjust your driving speed to the ambient conditions.
- Avoid sudden load changes (sudden movements to the right or left).
- Make sure you have adequate steering and braking ability. Driving characteristics, steering, and braking behaviour are all influenced by the towed machinery (increased braking distance as a result of greater inertia).

Preparations in the Field

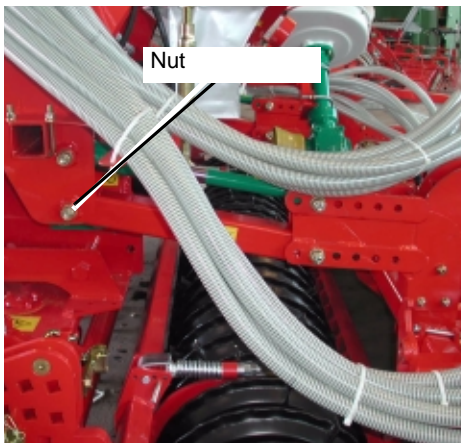
Ground Clearance Adjustment

The correct ground clearance is essential for the proper operation of the seed drill. Ground clearance is measured from the upper edge of the coulter bar to the ground.



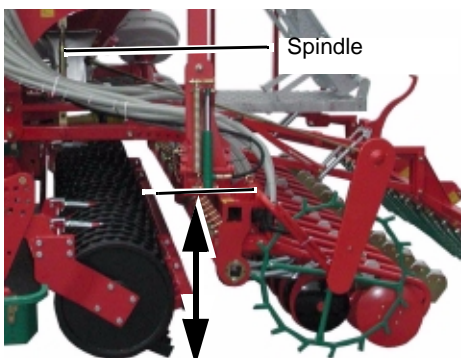
Without hydraulic coulter bar lifting

- Loosen but do not unscrew the nuts.



With hydraulic coulter bar lifting

- Loosen but do not unscrew the nuts.



- Turn the spindle until the ground clearance is 52-57 cm. Do not make the entire adjustment at once. Make no more than 2 turns on a given side, followed by an equal number of turns on the opposite side.
- Retighten the nuts. Tighten only the indicated nuts for equipment with hydraulic coulter bar lifting. The remaining nuts have been properly torqued at the factory.

Ground clearance from the upper edge of the coulter bar to the ground: 52-57 cm

Seed hopper, loading



- Only use the loading steps to climb onto the platform.
- Remove all seed residue from the hopper when changing seed types.
- The hopper emptying flaps on the metering devices must be closed before filling the hopper with seed.

Fill the hopper in the normal manner.

Changing Seed Types

Before adding a different seed type to the seed hopper, remove all old seed residue from:

- The seed hopper;
- The metering device;

As described in the Chapter, »Operation«, Section »After Drilling«.

Before adding a different seed type the hopper emptying flaps on the metering devices must be closed.

Preparations in the Field

Before Filling

Unfolding the Loading Step

- Release the lock and unfold the loading step.



Fold the tarp back.

- Fold the tarp on the seed hopper back. By:
- Release the tarp lock.
- Inspect the seed hopper for foreign objects and remove them.

Loading

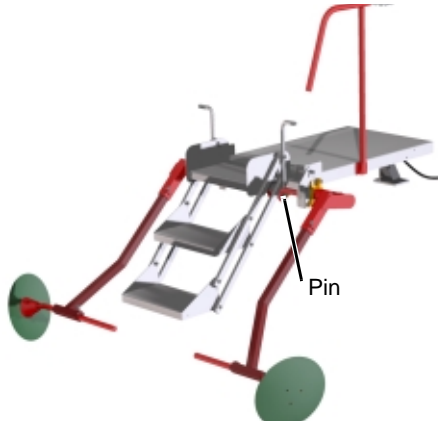
- Fill the hopper in the normal manner.

- NOTE:**
- Minimum seed hopper fill level:
3 cm above the hopper low level sensor;
 - Maximum seed hopper fill level:
Cereal grains, etc. = Underside of the hopper cover
Rape or grass seed = Label in the hopper

After Filling

- Pull the tarp over the seed hopper and lock it in place.
- Fold the loading step up.

Pre-emergence markers in the operating position



The pre-emergence markers must be unfolded into their operating position.

- Release the pre-emergence markers.
- Fold the pre-emergence marker down.

The pre-emergence markers must be retracted for transport.

Preparations in the Field

Adjustments

Share Pressure Check

If the share pressure has already been optimally adjusted to the soil conditions, no further adjustment is required. If not, refer to the adjustments in the Chapter, "Preparation Work - Drilling".

Inspection Tasks

Use the checklist for the inspection.

Prior to Drilling

- ☐ Is the ESA, ESC, or FGS operating correctly?
- ☐ Have all counters on the ESA or ESC been reset to zero?
- ☐ Has the correct tramlining rhythm been set?
- ☐ Correct distributor head in the main distributor?
- ☐ Flow control valve properly adjusted?
- ☐ Micrometering system correctly switched?
- ☐ Cleaning brush OK?
- ☐ Seed value set?
- ☐ Shut-off valves OK?
- ☐ Seed delivery tubes checked for sagging?
- ☐ Track markers adjusted and extended?
- ☐ Drive wheel in operating position?
- ☐ Share checked for blockage?
- ☐ Hopper emptying flaps closed?
- ☐ Is the folding ladder retracted?

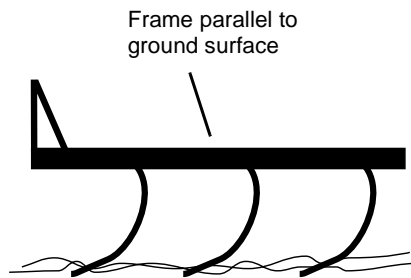
Test drive



- No one is permitted to be in the machinery during the test drive.
- No one is permitted to remain within the operating range of the machinery. Pay particular attention to children.
- The folding ladder must be retracted at the seed hopper.

After completing all preparatory work, take a test drive. Lower the machinery to its operating position.

Lower the machinery to its operating position



- Lower the machinery to its operating position. During cultivation, the frame should be parallel to the ground.

Test drive

First perform a test drive in the operating position at operating speed (10-12 km/h). During this test drive, the tractor hydraulics are Set to "float".

- Tip** Make the test drive without sowing over a typical section of the field. The headland or areas with obstacles are not suited for the test drive.

Operation



- Do not remove any of the required guards.
- Check the immediate surrounding area.
- Watch for children.
- Ensure unimpeded visibility.
- No one is permitted to remain within the swivelling range of the cultivating implements, pre-emergence markers, track markers, drive wheel, etc.
- During extension and retraction, components exceed a height of 4 m. Never extend/retract the equipment in the vicinity of overhead power lines! Danger of electrocution!
Should the equipment come into contact with an overhead power line:
 - Do not attempt to leave the tractor cabin;
 - Do not touch any metal parts on the tractor;
 - Do not create a grounding connection;
 - Warn others not to approach the tractor or the machinery.
 - Wait for professional emergency rescue personnel to arrive.Power in the overhead line must be switched off.

Drilling



- Drilling with the ESA always turn the RPM alarm on during drilling, otherwise the metering device can start while the fan drive is off.
- When drilling with the ESC always leave the ESC switched on during drilling, otherwise no alarms can be generated.
- When drilling with the FGS, always leave the FGS turned on during drilling, otherwise no alarm messages can be generated.

The extension and retraction of the implements and the track markers as well as the headlands, operating, and transport positions for the machinery are described in detail in the Chapter, »Hydraulic System«.

Adjustments and tasks performed with the aid of the ESA, the ESC, or the FGS are described in detail in the Chapter, »ESA« or »ESC«, as are the calibration test and the calculation and adjustment of the tramlining rhythm.

During drilling, access the required information from the ESC or the ESA.

NOTE Before you begin sowing, check the input values in the ESA or ESC.

Operating Position and Cultivation

- Bring the machinery into its operating position.
- Switch the ESA or ESC on.
- Lower the track marker on the correct side.
- Switch the fan on.
- Begin drilling.

ESA

As soon as the metering device is under power, a flashing arrow appears on the display to provide a visual indication. The amount (kg / hectare) currently being delivered is also displayed.



- If desired, press the operating information key on the ESA. The display then shows you the current information pertaining to: Driving speed, all information related to hectare performance, and information concerning the metering shaft.

ESC



As soon as the metering devices are under power a flashing circle appears on the display as an optical indicator, together with the most recent display.

- Press the ESC information keys, if desired. The current information selected will then appear on the display.

Operating speed

During drilling, monitor the working speed. The possible working speed within the range of 5 - 12 km / hr depends on the soil type and soil preparation.

Where the soil is loose and the working speed is too high, the front sowing rows can easily be covered by too much soil by the rear shares. In this case, either drive more slowly or reduce the share pressure.

Operation

Raising the Track Marker

Raising the track markers, e.g., to avoid obstacles, interrupts the metering device drive.

When raised, a track marker must be retracted to its stop. This automatically switches the control block to the other track marker.

ESA

To continue sowing, select "GO ON DRILL" on the ESA.

When both track marker arms are raised, a "G" appears on the ESA display, indicating the arms are locked. You cannot change this display. It automatically disappears once the track marker arm is again extended.

When the track marker arm is again lowered to the operating position, the metering device drive automatically restarts.

ESC



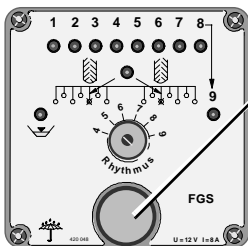
With the ESC, the tramline is advanced by 1 track. You must reset the tramlining sequence after passing the obstacle.

- Press and hold the key until the original tramline sequence reappears on the display
- Release the key

FGS

With the FGS, the tramline is advanced by 1 track. After passing the obstacle, you must reset the tramlining sequence.

- Continue pressing the key until the original tramline sequence is again displayed.



Taste

Turning

The machine is raised for turning manoeuvres.

- Throttle the engine back just before reaching the edge of the field and raise the seed drill while still driving.

ESA

- After the turn, lower the seed drill approx. 5 m ahead of where you want to begin sowing.

ESC, FGS

- After the turn, lower the seed drill approx. 1 m ahead of where you want to begin sowing.

ESA, ESC, FGS

At the end of the field, when the track marker changeover mechanism is activated, the ESA, ESC, and FGS automatically advance by one track.

NOTE ESA, ESC

This position remains in memory even if the power is switched off. Once power has been re-established, continue drilling with the same settings.

NOTE FGS

Always check the displayed task whenever there has been a power loss. Correct the information as required. Depending on the make of the tractor, the track count may be incremented when the power is again switched on.

Checks During Drilling

During drilling, use the checklist to examine the following:

- ☐ Does the PTO shaft speed remain constant during sowing?

From time-to-time, climb down and check the following:

- ☐ Sowing depth OK?
- ☐ Are all shares unobstructed?
- ☐ Are the shut-off valves switching properly?
- ☐ Is the seed flowing freely through the shut-off valves?
- ☐ For rape:
 - Is the seed flow still OK?
- ☐ Is the rape brush working properly?
- ☐ Because of the tendency of glutinous seed to bridge:
 - Is the seed flow still OK?

Operation

After Drilling

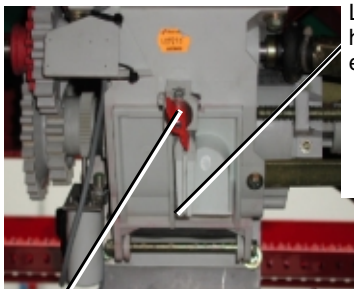
After drilling:

- Switch the machinery off;
- Empty the seed hopper;
- Empty the metering device.

Shutting the Machinery Down

- Turn the PTO shaft or hydraulic fan drive off.
- Park the tractor and machinery on a level surface.
- Bring the machinery to the transport position.

Emptying the Seed Hopper



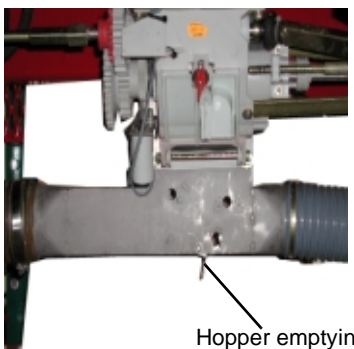
Locking the flap on the metering device

Locking the hopper emptying flap

- Place a catch pan under the metering device.
- Open the hopper emptying flaps. Catch the seed.
- Close the hopper emptying flaps.

- You can also turn the star wheel or the hand crank completely empty the cells.
- If there is as much seed remaining in the hopper as will fill the catch pan, open the flap on the metering device to empty the hopper more rapidly. However, the flap cannot be closed against the force of the seed running out.

Emptying the Metering Device



Hopper emptying flap

- Place a catch pan under both hopper emptying flaps.
- Open the hopper emptying flaps.

ESA

- Turning on the ESA



SCROLL



MANUEL START

- Use MANUEL START to first start and stop the left (front) side, then the right (rear) side. This empties the metering device cells and any residue from the seed hopper.
- Close the hopper emptying flaps.

TIP This method can also be used to empty the entire seed hopper. For this purpose, use a high setpoint value for the metering device.

Cleaning



- A high-pressure cleaner, for example, can be used to clean the machine. Only use low pressure to clean the bearings.
- Housings, signal distribution boxes, electric drive motors, screw-on connections, and ball bearings are not waterproof.

Loading steps and platform, seed drill



The loading steps and platforms must be thoroughly cleaned after every operation in the field. Dirt build-up presents an increased risk of accidents and injury.

Prior to cleaning:

- Pull the tarp over the seed hopper and lock it in place.
- Open the hopper emptying flaps on the metering devices to allow any water that accidentally gets into the hopper to drain off.

After cleaning:

- Open the tarp and inspect the seed hopper for moisture. Wipe dry as required.
- the hopper emptying flaps on the metering devices open.

NOTE Only wash the outside of the seed drill with water.

Cleaning and Care

Shares, Seed Delivery Tubes, and Seed Hopper

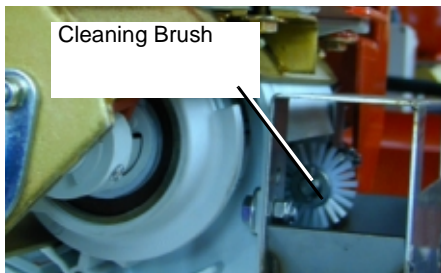
- Use compressed air to clean the shares, seed delivery tubes, and the seed hopper.

Metering device

Under no circumstances may a high-pressure cleaner be used for the following cleaning operations.

After every seed change, empty all seed remaining in the metering devices and the seed hopper out through the hopper emptying flaps. Refer to the Chapter, »Operation«, Section, »After Drilling«, page 138.

Cleaning Brush



- Clean the cleaning brushes on both metering devices.
- Check the brushes for freedom of movement while cleaning them.

Care

To ensure the equipment's long service life, we recommend applying a protective coating of oil at the end of the season and during storage. Use only approved and biodegradable oil. E/ g., rape seed oil.

Parking and Securing the Machinery



Uncoupling the unit from the tractor creates an increased risk of injury. Therefore:

- Make sure the unit will be lowered onto a level and stable surface;
- After uncoupling, chock the tractor wheels to prevent the vehicle from rolling;

Empty the seed hopper;

- Empty the seed hopper. Refer to the Chapter, »Operation«, Section, »After Drilling«, page 138.
- Cover the empty seed hopper with a tarp.
- Leave the hopper emptying flaps open.

Uncoupling the Machinery

- Switch the ESA, ESC, or FGS off.
- For machinery equipped with oil brakes, chock the wheels.
- Extend and lock the landing gear.
- Remove the hydraulic and electrical connections.
- Uncouple the ESA, ESC, or FGS and remove it from the tractor bracket.
- Store the ESA, ESC, or FGS in a dry location. The ESA settings will remain in memory for some time.

Uncouple the machinery in the reverse order in which it was coupled, observing the special safety instructions.

Parking and Storage

Storing the Machinery

The clean machinery should be stored in a dry location and on a level and stable surface as described in the Section, "Parking and Securing the Machinery". For storage, leave the machinery in the transport position.

Apply a protective coating of oil during storage. Use only approved and biodegradable oil, e.g. rape seed oil.

→ Refer to the Chapter, "Cleaning and Care".

For Your Safety

Special safety information



- Only perform the maintenance operations if you have the required expert knowledge and suitable tools.
- Only use OEM replacement parts for components that are of particular importance to safety.
- Maintenance work and the correction of faults on the coupled machinery may only be performed with the PTO shaft turned off, the engine turned off, and the ESA, ESC, or FGS turned off!
- Always remove the tractor ignition key. This will prevent the machinery from being accidentally started.
- Make sure no one stands between the tractor and the machinery if the machinery has not been chocked to prevent it from rolling.
- Before starting any work, chock the machinery wheels.
- Never use a pneumatic grease gun to lubricate bearings.

Protective measures for handling oils or lubricants

Additives in oils and lubricants may have adverse health effects. Since the hazardous material code does not require any special identification, please always observe the following:

- Avoid skin contact with these materials. Contact can result in skin damage.
- When handling oils and lubricants, protect your skin with lotion or wear oil-resistant gloves.
- Never use oils or lubricants to clean your hands. Burrs and grit in these materials can result in injuries.
- Change clothing heavily contaminated with oil as soon as possible.
- Do not put oily rags in your pockets.

NOTE:

- Used oil must be properly collected and disposed of.
- Immediately consult a doctor in case of skin damage caused by oils and lubricants.

General information

This information relates to general maintenance operations. Specific maintenance tasks for the individual cultivation implements are described later, broken down according to operational zones. For all maintenance work, the machinery must be extended and secured in its operating position. If it is necessary to put the machinery in its transport position for maintenance work, an appropriate reference will appear in the maintenance instructions.

TIP Working with the grease gun

One to two strokes of the grease gun handle are sufficient for lubrication. If you feel resistance during the second stroke, do not complete it. Too much grease will force the bearings apart. This will allow dust and dirt to enter the bearing and resulting in premature wear.

Fundamentals

The following table contains a brief explanation of the most important terms used for maintenance.

Task	Explanation
Greasing	The application of grease to sliding surfaces with a brush.
Lubrication	Explanation: Unless otherwise specified, 1-2 strokes with a grease gun are generally sufficient.
Oiling	Unless otherwise specified, use only vegetable-based oil such as rape seed oil. Mineral oils are not suitable. The employment of used oil represents a health hazard and is strictly prohibited.
Replacement	Replace the component in question according to the instructions in the "Maintenance" chapter.
Inspect	An inspection may be required in conjunction with the replacement of the component in question.
Observe the maintenance intervals	All information is based on average machinery usage. In cases of excessive usage starker (e.g., contract work) shorten the maintenance intervals accordingly. Shorter maintenance intervals may also be required under extreme operating conditions (e.g., heavy dust generation).

Maintenance Intervals

		After 2 hours of operation	Daily	After 25 hours of operation	once per season.	After excessive use	As required	In case of wear	Lubrication	Greasing	Inspect	Replacement	Page
General	Retighten all screws	•			•	•							146
	Bearings				•	•			•				146
	Hydraulic hoses every 3 years and						•	•				•	152
ESA/ESC	All sensors						•					•	from 151
Drill Technology	Reduction head						•					•	148
	Hose connections				•						•		–
	Metering device - Sealing lip on the metering device - Cleaning brush							• •				• •	149 149
	Fan drive – (mechanical only) V-belt – Bearing		•					•	•			•	– –
	Angular gear for the fan drive – Change the gear lubricating oil. 0.6 l SAE 90 EP				•								
	PTO shaft According to the PTO shaft manufacturer's instructions								•		•		–
Miscellaneous	S covering tines – Covering tines – Folding shaft				•			•	•			• •	146 –
	Track marker				•	•			•				150
	Coulter pressure adjustment hydraulic valve				•		•		•				–

maintenance

Retighten Screws

All screws must be re-tightened

- after the first two hours of operation and
- depending on the frequency of use,
- at least once every season.

Lubricate bearings

The bearings must be lubricated regularly. Only use 1-2 strokes with the grease gun.

- After excessive use, but;
- but at least once every season.

Operational zone, "Covering"

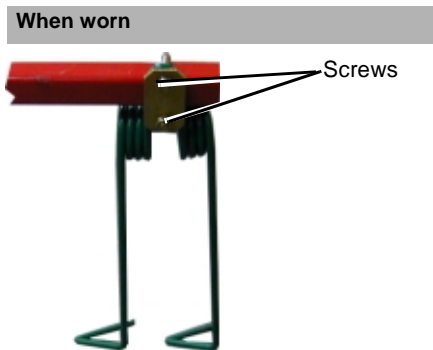
S covering tines

Task

- Replace the S covering tines.

If the covering tines are worn, they must be replaced. Individual tines can be replaced.

Covering Tine Replacement

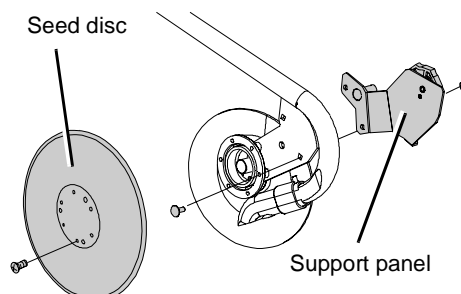


- Loosen and remove the screws.
- Replace the covering tine(s).
- Insert the screws and tighten securely.

Drill Technology

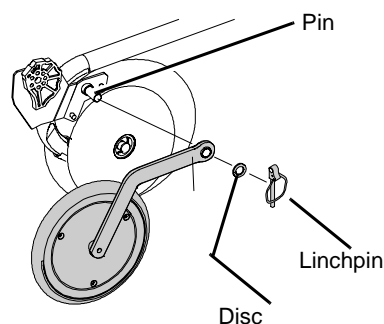
Gauge Wheel for CX Sowing Coulter Replacement

To retrofit a CX disc sowing coulter with a narrow or wide gauge wheel, or to replace the gauge wheel, proceed as follows:



- Loosen the screws on the seed disc and remove the seed disc.
- Mount the support panel on the share with two saucer-head screws.

NOTE The support panels for long and short shares are different.



- Push the gauge wheel arm onto the support panel bolt.
- Secure with a washer and bolt.
- Screw the seed disc back in place.

PTO Shaft



- Park the machinery on a level surface, turn the tractor engine off, and remove the ignition key.
- After the machinery has been turned off, centrifugal mass may continue to turn the shaft. Do not approach the machinery. Wait until the machinery has completely stopped before beginning with the work.
- Chock the machinery wheels to prevent it from rolling.

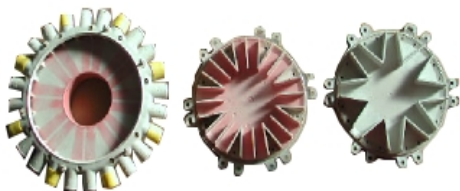
A number of maintenance tasks must be performed at various intervals for the PTO shaft. You must perform the following:

- Greasing
- Lubrication

The individual maintenance tasks are described in detail in the PTO shaft manufacturer's instructions.

Replace the reduction head

As required

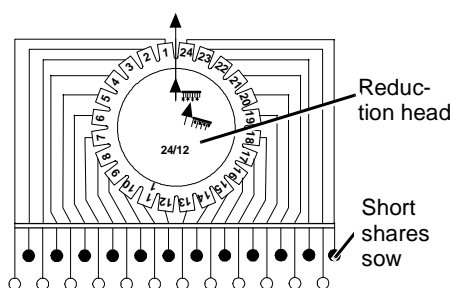


Task

- Replace the reduction head.

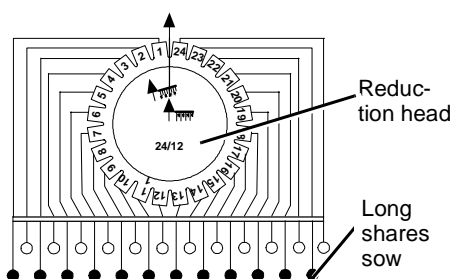
If the row width changes, you will need a different reduction head on the distributor. When the reduction head becomes worn, replace it.

- Bring the machinery into its operating position.
- Switch the engine and PTO shaft off, remove the ignition key.
- Loosen the and remove the thumbscrews on the reduction head.
- Replace the reduction head.



Rotate the reduction head as shown in the figure, depending on which share you wish to activate. The reduction head division on your seed drill may differ from the figure.

- Activate the share row with the short shares.
Front arrow points in the direction of travel.
- Activate the share row with the long shares.
Rear arrow points in the direction of travel.



- Rotate the reduction head so that the desired arrow points in the direction of travel.
- Secure the new reduction head in the correct position with the thumbscrews.

NOTE:

Please note:

- If you have two metering devices, you will also require two reduction heads.
- It may also be necessary to readjust the track markers.

Metering Device



The machinery must be in the transport position and be secured against rolling and extending.

Task

- Remove residual seed.
- Replace the sealing lip.

Sealing Lip

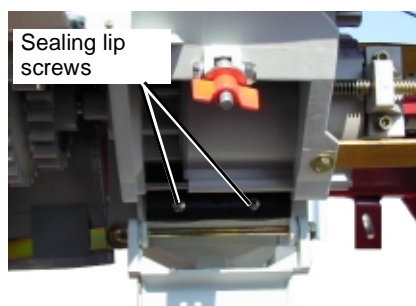
IF the sealing lip behind the hopper emptying flap is worn, replace it.

Remove residual seed.

If residual seed remains in the seed hopper, you must first remove it.

Sealing Lip Replacement

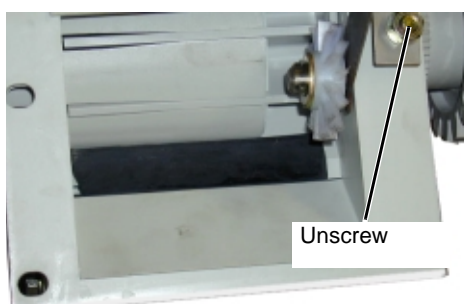
When worn



- Open the hopper emptying flap.
- Unscrew the worn sealing lip and replace it.
- Close the hopper emptying flap.
- Reinstall the air hose under the hopper emptying flap and secure it with the hose clip.

Cleaning Brush Replacement

When worn



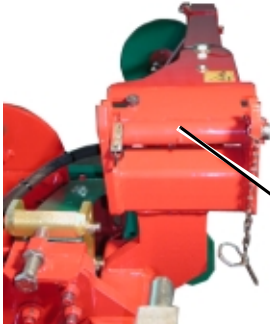
- Unscrew the worn cleaning brush from the rear of the metering device and replace it.

maintenance

Hydraulically Retracting Track Markers

Bring the machinery into its operating position and extend the track markers.

- Grease both pivots of the hydraulically retractable track markers.



Grease nipple
only accessible
with the track
marker extend-
ed.

ESA

This section contains information concerning adjustment and sensor replacement.

Sensor Adjustment

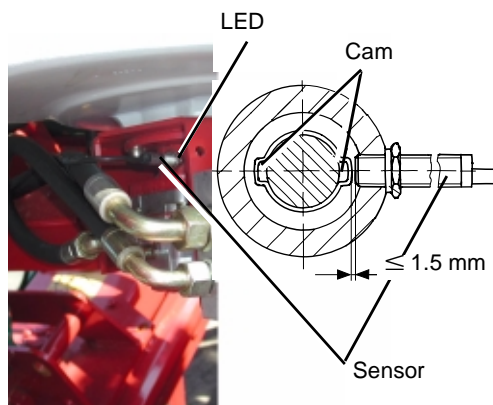
The following sensors are linked to the ESA or ESC:

Operation sensor;	ESA	ESC
Revolution sensor;	X	X
Radar sensor (accessory equipment)	X	–
Shut-off valve sensors;	X	X
Sensors on the metering shafts;	X	X
Track marker sensors;	X	X
Hopper low level sensors (accessory);	X	X
Travel sensor	X	X

With the exception of the revolution sensor, all other sensors may only be adjusted in the shop.

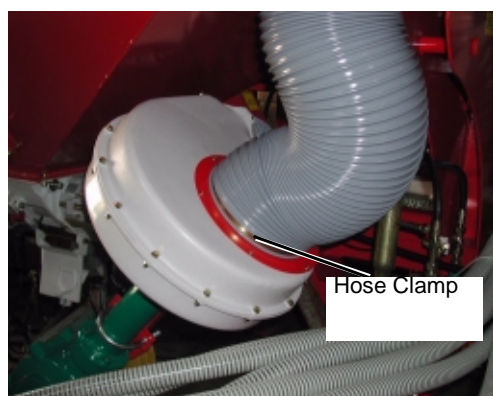
Revolution Sensor Adjustment

If you find that the rpm display does not increase in accordance with the speed, or if no rpms are displayed, it may be that the sensor pulse is only being generated by a single fan cam (normally, there are two pulses per rotation, from two cams). In this case, adjust the revolution sensor setting.



- Slightly loosen the sensor nut.
- Advance the sensor into the fan shaft bearing until it contacts a cam.
- Then back the sensor out one-half turn. The distance to the cam should be approx. 1.5 mm.

Check that the cams pass by the sensor without hindrance.



- Unscrew the hose clamp and remove the hose.
- For ESA: Switch the ESA on and call up the "TEST INPUTS" display. Carefully turn the fan by hand. The cams should not touch the sensor, but should produce two pulses per revolution. As it passes the sensor, each cam generates a switching pulse, and the LED on the sensor goes on twice during each fan revolution.
- Secure the sensor with the nut.
- Reattach the hose.

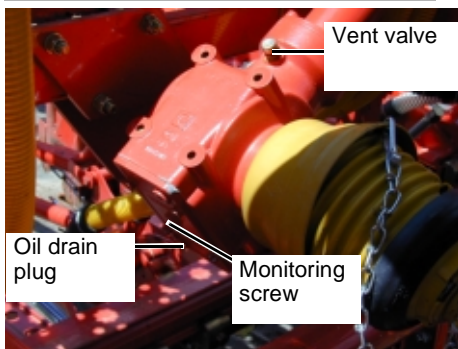
Hydraulic Hoses

Hydraulic hoses can age without this being externally visible. Therefore, we recommend that the hydraulic hoses be replaced every three years.

NOTE Hydraulic hoses on the frame or track marker may only be replaced with the machinery extended and in compliance with all relevant safety regulations. All pressure must have been released from the hoses.

Angular gear

Annually



The gear lubrication oil for the fan drive's angular gear must be changed annually.

Requirement: 0.6 l
Specification: SAE 90 EP

Drain the oil:

- Place a catch pan under the drain opening.
- Unscrew the drain plug.
- Screw the plug back in when the oil has drained.

Add oil:

- Unscrew the vent valve.
- Add 0.6 l of SAE 90 gear lubricating oil.
- Screw the vent valve back in.

Miscellaneous Lubrication Points

The following applies:

- Aside from the lubrication points cited in this manual, your machinery may have additional lubrication points.
- As a rule, lubrication points are located at pivots or bearings. Therefore, inspect your entire machinery for any such additional lubrication points.

The figure is an example of the most common location of grease nipples on a component. If there are several of these components installed, the grease nipples on each of them must be lubricated.

Normal Coulter

Ideal for all normal seeding conditions. The normal coulter is employed with conventional seed (without plant residue).



For the normal coulter you also receive a ceramic coulter that exhibits significantly less wear than conventional metal coulters.

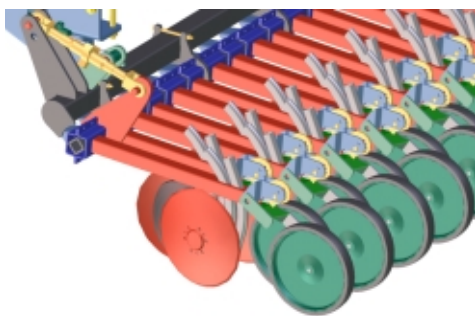
CX sowing coulter

Ideal for those requiring a coulter for normal as well as mulching/sowing conditions, and available with either narrow or wide gauge wheel, as specified.



CX-plus coulter

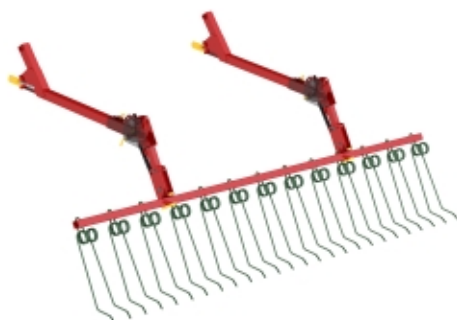
The CX-plus coulter is a multifunctional coulter. As a result of its high share pressure, it is also particularly well suited to extremely difficult soil conditions. The CX-plus coulter is designed for simultaneous fertiliser spreading.



Accessory Equipment

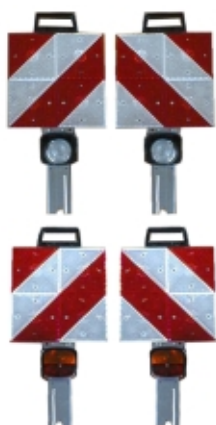
S covering tines

The S covering tines cover the seed uniformly with soil.



Lighting equipment

A lighting system is available for protection conforming to regulations. The warning signs with the lights can be removed in a flash and used on other machines or devices. Only the brackets remain permanently installed.

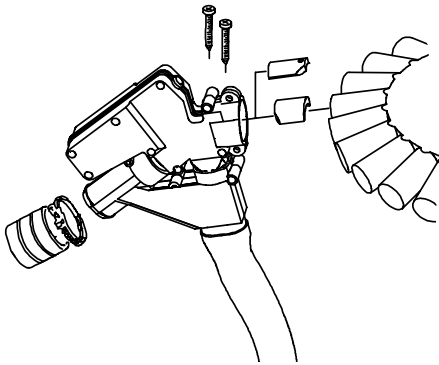


Pre-emergence marker



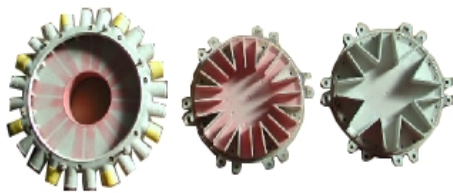
The pre-emergence markers mark the path for field sprayers or manure spreaders. The pre-emergence marker is equipped with one or two markers.

Shut-off valves



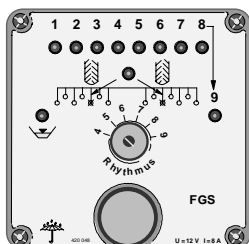
Shut-off valves are required if a tramline is to be set up. The seed blocked by the closed shut-off valve is distributed to the adjacent share.

Reduction Head



Distributors uniformly distribute the seed to the seed delivery tubes. Other reduction head permit, for example, the row spacing to be doubled.

FGS

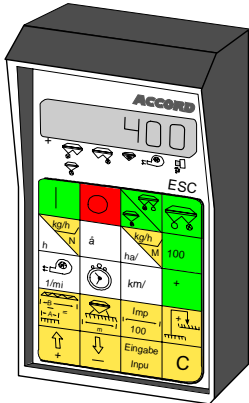


The tramlining control system can be used to set up tramlines for the following spraying/fertilising tractors. The FGS is available in 2 versions:

- | | |
|--------|-----------------------------|
| Type 1 | for rhythms: 4,5,6,7,8,9 |
| Type 2 | for rhythms: 3,4S,5,6S,7,8S |

Accessory Equipment

ESC



The ESC offers control and operation of the seed drill from the tractor. It monitors the metering device.

Some accessory equipment can only be used in conjunction with the ESC, e.g., metering device shut-off or electronic seed rate adjustment.

ESA

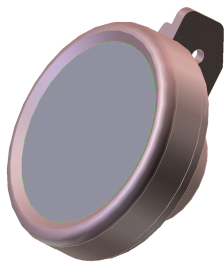


The ESA is an all-inclusive control and operation platform for the seed drill from the tractor. It drives, regulates, and monitors the metering device. Task data can be flexibly created, saved, and transferred. Some accessory equipment can only be used in conjunction with the ESC, e.g., metering device shut-off or electronic seed rate adjustment.

Printer

A thermal transfer printer is available to print out tasks in conjunction with the ESA.

Hopper Low Level Sensor



The hopper low level sensor provides an indication that only a residual amount of seed remains in the seed hopper.

Eliminating Malfunctions

Malfunctions can often be eliminated quickly and easily. Please read the associated safety information.

ESA

Malfunction	Cause	Remedy
ESA receiving no pulses.	Supply voltage interruption	<ul style="list-style-type: none">• Connect the power cord if it has been disconnected.• Check the voltage. The supply voltage must be 12 V.
Sensors on the shut-off valves or the drive motors receiving no pulses.	Fault at the shut-off valves or the metering device drive motors.	Use the ESA function keys to check the shut-off valves and motors. Contact customer service as required.

Eliminating Malfunctions

Hydraulics

Malfunction	Cause	Remedy
Hydraulic fan drive		
Hydraulic fluid overheating.	Although the oil flow can be regulated at the tractor, it was actually regulated at the machinery.	Fully open the 3-way flow control valve on the machinery and adjust the fan speed at the tractor.
Hydraulic fluid will overheat if the tractor is not equipped with a flow control valve.	The 3-way flow control valve on the machinery is set for 2-way flow control.	Adjust to 3-way flow control.
Hydraulic fluid heats too quickly.	Insufficient fluid in the reservoir. The returning fluid mixes with the insufficient amount of fluid in the reservoir, resulting in the fluid heating too rapidly.	Have an additional oil cooler installed.
	The large volume of fluid being moved rapidly in a closed system is overtaxing the regulation by the tractor's pump.	Have the pump and regulator on the tractor inspected.
Hydraulic motor stops briefly.	The hydraulic fluid return is poor.	Select a different connection point for the pressure-less return.
	Insufficient fluid reserves in the tractor.	Have a larger fluid reservoir installed.
	Supplemental control valve activates	Do not activate while working.
Hydraulic motor provides insufficient speed	3-way flow control valve incorrectly adjusted.	Check and readjust the 3-way flow control valve.
	Tractor unable to provide sufficient fluid or unable to reach operating pressure.	Have the hydraulic pump inspected. Have the pressure limiter valve inspected.
Valve stem pops out of its latch	Pressure peaks during run-up. Shut-off pressure too low.	Check the pneumatic system's drive performance.
	Run-up pressure too high.	Have pipelines installed by specialist shop.
Fan does not run at required speed.	Pneumatic lines not completely closed.	Completely close the seed drill's pneumatic system.

Eliminating Malfunctions

Malfunction	Cause	Remedy
The hydraulic motor shaft seal being pressed out.	Return pressure too high.	Reduce return pressure to 15 bar, max.
	Feed and return lines reversed.	Reinstall the lines correctly and secure all couplings.
Fluid leaking from the hydraulic motor.	Worn or reversed shaft seal.	Have a new shaft seal installed or have the current one installed in the right direction.
Miscellaneous		
Track marker unfolds very quickly.	No throttle in the hydraulic line.	Have a throttle installed.
	Throttle in the hydraulic line too large.	Have the throttle replaced.
Track marker unfolds too slowly or not at all.	Throttle in the hydraulic line is blocked.	Have the throttle cleaned.
	Throttle in the hydraulic line too small.	Have the throttle replaced.
Both track markers unfold simultaneously.	Defective change-over valve.	Have the change-over valve replaced.
Pre-emergence marker does not move.	Throttle in the hydraulic line is blocked.	Have the throttle cleaned.

Eliminating Malfunctions

Fan

Malfunction	Cause	Remedy
Speed drops.	Worn V-belt	Have the V-belt replaced
Increasing rpm drop to approx. half-speed.	Pulse only being provided by one cam.	Correct the revolution sensor setting. → Chapter, »maintenance«, Section »ESA«, »ESC«
Tachometer only registering half the actual speed.	Pulse only being provided by one cam.	Correct the revolution sensor setting. → Chapter, »maintenance«, Section »ESA«, »ESC«
Tachometer shows no reading.	No power supply.	Check the wiring and fuses.
	No pulse generated.	Correct the revolution sensor setting. See above.
	Defective sensor.	Check and, if necessary replace, the revolution sensor. → Chapter, »maintenance«, Section, »ESA«

Drill Technology

Malfunction	Cause	Remedy
No tramlines are set up.	Insufficient voltage at the socket.	Check the socket and plug for corrosion.
	Shut-off valve fails to switch.	Replace the shut-off valve Chapter, Maintenance, Section, Shut-off Valve Replacement.
Tramline share remains blocked at each pass.	Shut-off valve sticking.	Clean the shut-off valve.
	Foreign object in the main distributor.	Remove foreign object.
Pre-emergence marker does not move.	No power to the shut-off valve.	Check the wiring and connections.
Metering device making cracking noises.	Very large seeds (e.g., beans)	Remove the clamping sleeve from the metering device agitator shaft.

Eliminating Malfunctions

Malfunction	Cause	Remedy
Seed volume changes by itself.	<p>Seeds have attracted moisture.</p> <p>Seed volume adjustment spindle moves too freely.</p> <p>Metering device cell wheel adhering.</p> <p>Micrometering system locking tap not engaged (e.g., for fine seed).</p>	<p>Empty the seed hopper overnight.</p> <p>Change the spindle adjustment. Retighten the nut on the calibrating handle.</p> <p>Clean the cell wheel. Check and clean the cleaning brush. Replace if required.</p> <p>Switch the micrometering system on by allowing the locking tap to engage.</p>
For fine seed: Despite micrometering, the seed rate does not drop below 4-5 kg/ha.	<p>Sealing lip on the metering device defective.</p> <p>Sealing lip does not contact the cell wheel properly.</p>	<p>Replace the sealing lip.</p> <p>Position the sealing lip correctly.</p>
Distributed seed volume too large.	<p>Rotating too quickly during calibration test.</p> <p>For fine seed: Locking tap not engaged.</p>	<p>Only one rotation per second during the calibration test.</p> <p>Switch the micrometering system on by allowing the locking tap to engage.</p>
Distributed seed volume too large or too small.	<p>Incorrect setpoint values.</p> <p>Error in weighing the seed.</p>	<p>Correct the setpoint values in the ESA.</p> <p>Make sure the scales are working properly. use a sufficiently precise scale, not a household scale. Do not include the container weight in the calculations.</p>
Distributed seed volume too small.	<p>Normal seed: The micrometering system is switched on.</p> <p>Fine seed: Dirty cells</p> <p>Cleaning brush no longer moves.</p>	<p>Deactivate the micrometering system.</p> <p>Clean the cells with a brush.</p> <p>Clean or replace the cleaning brush. → Chapter, »maintenance«, Section, »Metering Device«</p>
Every second seed row begins later.	The rear shares have sown too deeply.	Share Pressure Check

Eliminating Malfunctions

Malfunction	Cause	Remedy
Seed volume changes by itself.	<p>Seeds have attracted moisture.</p> <p>Seed volume adjustment spindle moves too freely.</p> <p>Metering device cell wheel adhering.</p> <p>Micrometering system locking tap not engaged (e.g., for fine seed).</p>	<p>Empty the seed hopper overnight.</p> <p>Change the spindle adjustment. Retighten the nut on the calibrating handle.</p> <p>Clean the cell wheel. Check and clean the cleaning brush. Replace if required.</p> <p>Switch the micrometering system on by allowing the locking tap to engage.</p>
For fine seed: Despite micrometering, the seed rate does not drop below 4-5 kg/ha.	<p>Sealing lip on the metering device defective.</p> <p>Sealing lip does not contact the cell wheel properly.</p>	<p>Replace the sealing lip.</p> <p>Position the sealing lip correctly.</p>
Distributed seed volume too large.	<p>Rotating too quickly during calibration test.</p> <p>For fine seed: Locking tap not engaged.</p>	<p>Only one rotation per second during the calibration test.</p> <p>Switch the micrometering system on by allowing the locking tap to engage.</p>
Distributed seed volume too large or too small.	<p>Incorrect setpoint values.</p> <p>Error in weighing the seed.</p>	<p>Correct the setpoint values in the ESA.</p> <p>Make sure the scales are working properly. use a sufficiently precise scale, not a household scale. Do not include the container weight in the calculations.</p>
Distributed seed volume too small.	<p>Normal seed: The micrometering system is switched on.</p> <p>Fine seed: Dirty cells</p> <p>Cleaning brush no longer moves.</p>	<p>Deactivate the micrometering system.</p> <p>Clean the cells with a brush.</p> <p>Clean or replace the cleaning brush. → Chapter, »maintenance«, Section, »Metering Device«</p>
Every second seed row begins later.	The rear shares have sown too deeply.	Share Pressure Check

Eliminating Malfunctions

Malfunction	Cause	Remedy
No seed arriving at any share.	Venturi cone blocked.	Remove the clog and make sure the engine speed is correct.
	PTO shaft not turned on.	Turn the PTO shaft on.
Seed delivery tube blocked with seed.	Shares blocked, e.g. with soil.	Clean blocked shares. Adjust regulating flap for normal seed.
	Normal seed: Regulating flap on the fan set to fine seed.	
	There is a kink in the tube, it is sagging, or is bent.	Check the tubes outside the seed hopper. If necessary, shorten the tubes.
	Fan speed set too low.	Check for correct fan speed.
S covering tines working too deeply.	Pressure too high.	Decrease the pressure.
	Depth incorrectly adjusted.	Correct the depth setting.
S covering tines blocked.	Covering tine angle too steep.	Select a different angle setting.

Warranty guidelines

1. Our products are guaranteed for a period of 12 months starting on the date of delivery to the user. The guarantee does not cover the replacement of parts subject to wear.
2. Guarantee claims must be submitted on Kverneland guarantee claim forms to Kverneland's Customer Service Department in Soest. Claims cannot be considered unless the claim form has been completed in full and submitted not later than 3 months after the occurrence of the damage or defect.
3. Parts replaced under the terms of the guarantee will first of all be charged to the customer pending a decision by Kverneland's Customer Service Department as to whether or not the guarantee claim is justified. Parts replaced under the guarantee must therefore be returned to our factory for inspection.
4. Once the guarantee claim has been acknowledged, a credit note will be issued on the basis of the current prices on the date on which the guarantee claim was received and in accordance with Kverneland's general terms of delivery and payment.
5. Our factory must be consulted when the damage exceeds a value of Euro 150.

No liability for consequential damage

Any claims for damages not directly affecting the machine, cannot be accepted. This includes consequential damage resulting from incorrect metering, distribution or cultivation.

Kverneland machines are manufactured with the utmost care. However, fluctuations in the quality of results may still occur, even in the case of proper use. Possible causes could be, e.g.:

- unsuitable soil (e. g. extremely hard or stony)
- unsuitable soil conditions (e. g. extremely moist or dry)
- damage due to external influences
- clogging due to crop residue
- incorrect driving speed
- incorrect machine settings (e. g. working depth, operating angle)
- wear and tear of parts subject to wear

In addition, for sowing equipment:

- Variations in the composition of the seed or fertiliser (e.g., grain size distribution, density, geometric shapes, dressing, treatment)
- Blockages due to bridging (e.g., as a result of foreign objects, glutinous seeds, adhesive dressing, moist fertiliser);
- Incorrect drive speeds and driving speeds

Consequently, check the machine for proper function before and also during each use.

When the service life of your machine is over, it must be properly disposed of. Please observe the current and valid waste disposal regulations.

Metal parts

All metal machine components can be sent for ferrous metal recycling.

Tyres

Tyres can be sent to tyre recycling facilities.

Oil

Store fluid from the hydraulic system in a suitable container for disposal at a used oil facility.

Electronics

PCBs and ESC, ESA, or FSG computers are considered to be scrap electronic material and must be disposed of separate from other waste. If there is no site that accepts special waste materials in your area, you may also return the electronics to the manufacturer for disposal. It will then be disposed of in an environmentally-friendly manner.

EU Conformity Declaration

In accordance with EU
Guideline, 98/37/EG

Type plate and CE symbol



We

Kverneland Soest GmbH
Coesterweg 42
D-59494 Soest

declare under our sole responsibility, that the product

DA-X and Accessory Equipment

to which this declaration relates, conforms to the relevant basic safety and health requirements of EC Guideline 98/37/EEC.

For the relevant implementation of the safety and health requirements mentioned in the EC Guideline, the following standards have been taken into account:

- EN 292-1;2 (11. 1991);
- EN 294 (06. 1992)

Kverneland Soest GmbH
Soest, 01.03.2001 ã.

Christian Jungmann
Manager

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